

DOCUMENT RESUME

ED 214 331

EC 141 549

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TITLE Project SETT-UP: Special Education via Telecommunications, Teacher Upgrade. Five Year Report, June 1, 1976-August 31, 1981.
INSTITUTION Center for Excellence, Inc., Williamsburg, VA.
SPONS AGENCY Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.; Department of Commerce, Washington, D.C.; Department of Health and Human Services, Washington, D.C.; Virginia State Dept. of Education, Richmond.
PUB DATE Aug 81
GRANT G007602987
NOTE 339p.; Print is poor in parts.
AVAILABLE FROM Center for Excellence, Inc., P.O. Box 158, Williamsburg, VA 23187.
EDRS PRICE MF01/PC14 Plus Postage.
DESCRIPTORS *Disabilities; Elementary Secondary Education; Gifted; *Inservice Teacher Education; Program Descriptions; *Special Education; *Telecommunications
IDENTIFIERS *Project SETT UP; Virginia

ABSTRACT

The 5 year report on Project SETT-UP (Special Education via Telecommunications--Teacher Upgrade), a two way telecommunications inservice training project in southeastern Virginia, is presented. The report is organized into three sections concerned with personnel involved in the program, achievement of program objectives, and special program characteristics. Key program members are identified for such program areas as curricula development, program evaluation, statewide academic leadership, telecommunications system development, and fiscal/logistic management. The report details achievements of the following four goals: (1) to demonstrate in the peninsula area of Virginia that the intensive use of telecommunications technologies can provide and deliver effective inservice special education teacher training programs from a central location to remotely located classrooms, at times conducive to inservice teacher attendance, and at per inservice teacher costs within the limits of current budgeting policies and current methodologies; (2) to produce and distribute a comprehensive manual which will describe the curricula, operational needs, technical specifications, and personnel expertise of the project; (3) to make adaptive use of existing special education curricula and audiovisual materials; and (4) to implement an evaluation design and procedures to provide for the collection of quantitative performance data and the assessment of the effectiveness and efficiency of program resources. Much of the document consists of course descriptions, program brochures, reprints of the articles written about the program, and copies of letters concerning the program. Copies of newspaper articles are presented separately for each of the 5 years of the program. (DB)

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Project SETT-UP EC

Special Education via
Telecommunications: Teacher Upgrade

Five-Year Report
(June 1, 1976 - August 31, 1981)

Center for Excellence, Inc.
Williamsburg, Virginia 23187

EC141549

Project SETT-UP

(Special Education via Telecommunications: Teacher Upgrade)

Five-Year Report

(June 1, 1976 - August 31, 1981)

- PART ONE: The Written Report*
- PART TWO: A 29-minute tape describing the current uses of Project SETT-UP-developed methodologies
- PART THREE: A 15-minute tape designed to facilitate the replication of CenTex educational/medical/social service delivery systems and methodologies by others.

Funding Agency: Bureau of Education for the Handicapped, USOE

USOE Project Officer: Dr. Herman L. Saettler

Project Director: John A. Curtis

Grant Number: G007602987

(with substantial funding and in-kind support by the Virginia Department of Education; the US Department of Health and Human Resources; the US Department of Commerce; thirteen participating public and private school divisions and all major cable-system operators in Tidewater Virginia including the Hampton Roads Cablevision, Warner/Amex, Cox Cable and Continental Cable companies.)

Center for Excellence, Inc.

Post Office Box 158

Williamsburg, VA 23187

August 1981

*Supplementing operating and fiscal reports previously submitted to Project BEH's project officer(s); to the Virginia Department of Education-Special Service Division; to the Superintendents of participating Tidewater Virginia School Divisions and to the Directors of the Center for Excellence, Inc.

EC 141549

INDEX

Part One

	<u>Page</u>
<u>SECTION I - YOUR INTRODUCTION TO THE KEY MEMBERS OF THE PROJECT SETT-UP TEAM</u>	
A. In the area of curricula development	1
B. In the area of program evaluation	1
C. In the area of statewide academic leadership	4
D. In the areas of telecommunications system development	2
E. In the area of studio production expertise	4
F. In the area of fiscal and logistic management	4
G. In the areas of interdisciplinary management; broad knowledge of state-wide needs; and the in-depth operating experience to suggest and evaluate improvement concepts for Virginia's educational, medical and social services.	4
H. In the area of CenTeX's painful, near-death Caesarean birth: the calendar year of 1975.	6
1. The evaporation of CenTeX's academic support	6
2. The total disappearance of William and Mary academic leadership	6
I. In the area of identifying Project SETT-UP's (and CenTeX's) major unsung heroes.	7
1. The actions of Delegate George W. Grayson and the General Assembly's House Education Committee	7
2. The action of Mr. James T. Micklem	7
3. The actions of Dr. Paul Jay Fink and Terry Salasky	8
4. The action of Dr. Herman L. Saettler	8
J. In the areas of new funding and Special Education/BEH pertinent services.	8
1. From the Federal level:	9
a. From HEW (now HHR) Project SCS	9
b. From the Media Branch of the Federal Bureau of Education for the Handicapped (Project HITT)	9

	<u>Page</u>
c. From the National Telecommunications and Information Agency of the U.S. Department of Commerce (Construction Grant)	9
d. From BEH's Gifted and Talented Office (Project GETT-UP)	9
2. From state and local funding entities	10
a. The State Department of the Visually Handicapped and the Williamsburg United Way Fund	10
b. The State Department of Telecommunications	10
K. In the area of bottom-line funding	11
1. The Virginia State Department of Education	11
2. The Virginia State Department of Education	11
3. The local participating school divisions	11
4. The Virginia State Department of Education	11
5. The Virginia State Department of Education	11
L. In the area of summarizing the personnel capabilities, the resources (including funding) and the organizations which have made the innovative SETT-UP concept a real-life entity	12
1. A copy of CenTeX's current organization chart	following page 12
2. A copy of CenTeX's first organizational brochure	following page 12

SECTION II - DID PROJECT SETT-UP MEET THE PRE-PROJECT OBJECTIVES AND GOALS
ESTABLISHED BY THOSE WHO FUNDED THE PROJECT'S IMPLEMENTATION

A. The Project SETT-UP problem-solving objectives, implementation goals, and performance criteria (specifications)	13
B. Project SETT-UP performance specifications	14
C. Did Project SETT-UP meet the pre-implementation-established specifications?	15
1. A copy of CenTeX's first-semester Special Education curriculum bulletin	
2. A copy of CenTeX's most recent semester's Special Education curriculum bulletin	
3. A complete copy of the evaluation report covering the first three semesters of Project SETT-UP two-way curriculum delivery system.	
	following page 23

SECTION III - THE KEY TO THE DEPTH, BREADTH, AND EFFECTIVENESS OF PROJECT
SETT-UP'S PRODUCTIVITY AND THE DEVELOPMENT OF THE WORLD'S
FIRST MULTI-MEDIA/MULTI-SERVICE/EDUCATIONAL/MEDICAL/SOCIAL
SERVICES NETWORK WITH REASONABLY ATTAINABLE, LONG-TERM,
SELF-SUPPORTING, SELF-REGENERATIVE, EVER-EXPANDING PUBLIC
SERVICE POTENTIALS

- A. In the area of needs-based, learning-efficient, nationally useful, marketable curricula (needs assessment based, learning-efficient, nationally-needed and marketable curricula) 29
- B. In the area of research preceding the establishment of the CenTeX CIT-PEDS network. 30
- C. Research-identified system requirements 31
(For list of the 12 major requirements, see page 33)
- D. The critical rural and ghetto telecommunications delivery-system requirements and the economic way to supply them (the unique CenTeX Backbone/Rib System Design strategy) 34
- E. The continuing need for the services of a telecommunications research laboratory which (1) should operate in a near-perfect microeconomic geographic area of American life, (2) should be located near Washington, D.C., (3) should be controlled and operated by an inter-disciplinary board, (4) should be manned by a "lean", inter-disciplinary, low-overhead organization with a supporting "stable of competent", when-needed professionals, (5) should have readily available the pertinent "test" audiences and users, (6) must have ready access to all types of telecommunications circuits so their respective applications usefulness and cost factors can be analyzed, (7) must have accurate and comprehensive access to national experience so that continuing re-invention time-and-dollar costs are minimized and a full understanding of nationally important, as well as local and state needs and experience become major considerations during the development of Applications Research Agenda. 34
- F. The development of two-way delivery-system scope and applications flexibility 38
 - 1. By delivering simultaneously from a central point to remote classrooms and multi-student groups, and 38
 - 2. thereby lowering the per-student cost of teaching by multiplying the productivity of the better instructor. 39
- G. Developing and using cost-saving techniques and equipment
For example (1) by using low-powered equipment, CenTeX has reduced from approximately 9.4 and 4.0 million dollars to approximately 1.8 the equipment costs, and from approximately \$100,000 and \$49,120 to approximately \$11,082 the annual power costs of educational/medical/social services networks serving comparable geographic areas, (2) by using the F.C.C.'s authorized 375-line resolution standard, CenTeX (a) reduces studio and operating costs by 70% or more, (b) reduces personnel and other production costs by 70% or more; and makes a

curriculum evaluation dictated and and low costs. By making maximum use of existing facilities and services, CenTeX minimizes the time-and-dollar costs of capital investment and increases the distribution scope and depth of CenTeX's CIT-PEDS system. For instance, the CATV component of the CenTeX system today reaches approximately 108,000 subscriber homes and 302,400 persons and expects to be reaching approximately 230,000 homes and 644,000 persons by December 31, 1982. By renting the sub-carrier of a 50,000-watt FM station for \$5,500 per year, CenTeX is able to serve the sensory-deprived (1) over air or (2) via CATV FM circuits associated with its network, or via the sub-carrier commercial or public FM Stations within 50 miles of Williamsburg--without the need for interconnecting networks.

42

H. Keeping abreast of pertinent federal and state legislation and regulation. Examples:

43

1. At the state level - counteract the self-serving efforts of Public Broadcasting stations to monopolize state appropriations for Instructional TV .
2. Make certain that jurisdictional bodies know why public interest dictates that CenTeX-type non-profit networks deserve equal consideration under any state appropriation involving the distribution of educational/medical/social services.
3. At the Federal level, CenTeX's record of achievement enabled CenTeX to secure licensing of its mobile ITFS station (the first such F.C.C. approved) and the use of ITFS channels for networking and for multi-media interconnect purposes.

43

I. Backing a readily identifiable area

44

It has now become obvious that CenTeX's two-way systems are ideal for (1) interactive teleconferencing, (2) all types of professional training, (3) the devlivery of total family educational/medical/social services programming, and (4) services for the sensory deprived.

44

J. Make by-product multiple use of grant-developed assets and service development.

46

The availability of its privacy-protection circuitry makes the CenTeX system useful to many state and federal agencies, such as those concerned with health services and/or social services--which often require the privacy protection of human rights and/or tuition-and/or fee-based services and/or instruction. Another CenTeX likely new-source of services income may be the use of its unique Applications Research Laboratory by state and federal agencies and by the commercial manufacturers of products needing pre-marketing application testing. Further, 3 years ago, CenTeX established Virginia's first telecommunications system distribution of college-level, degree-credit, tuition-producing operation. Virginia's William and Mary has to date gained \$18,428 in tuition income from this CenTeX service; and now other Virginia-located institutions are beginning to take advantage of this resource-income producing component of CenTeX's operations.

- K. Use grant-developed products to store up dollars for the "rainy days". 46

CenTeX's inservice teacher-training curriculum has not only received wide-spread intra-state acceptance, but also has national recognition.

During less than a ten-month time period, word-of-mouth only enabled CenTeX to gross more than \$21,000 from the first national release of one of its curriculum series--with sales coming from seven states (including those as far away as Alaska, Idaho, and Missouri; and from one Canadian province; and one foreign country).

All dollars above the costs of making copies of tapes and materials and marketing them are, under the CenTeX procedure, put into a separate bank account to be used only for tape and materials updating.

- L. Recognize and record project learning for easy accessibility by others. 46

By carefully recording and checking the findings of its own research and making it available to others, CenTeX has developed reciprocal information relationships of great value, as well as minimal income sources for replication and use of its analyses and recommendations.

Further, these data can be used to develop publications and other dissemination and organizational development materials.

- M. Project SETT-UP's bottom line. 49

1. The CenTeX CIT-PEDS Network: 49

Network is actually four separate telecommunication systems--each designed to use the most efficient, least costly telecommunications methodologies to accomplish one or more public-service objectives--but coordinated and operated by a single management which would normally be employed to operate any single one of the four distinct systems.

System Number One: A series of five local broadcasting stations established for local use by the individual school divisions participating in the CenTeX program.

Currently, there are in Tidewater five local broadcasting stations using both over-air microwave and cable TV circuits to reach their school locations. (There are two more such stations scheduled for installation: one in Richmond; the other in Petersburg.)

Of the five stations, four (King William County, West Point, Williamsburg and Newport News) have been in operation for several years, while the fifth, in Virginia Beach, is scheduled to go into full operation in May 1982.

The primary public services of these stations as they are currently being used by the local school divisions are:

- (a) to deliver two-way teleconferencing between central office school administrators and their remotely located school managements and teachers;
- (b) to deliver specialty programming and support services from a central location to remotely located school locations and personnel;
- (c) to deliver school-student developed programming; and
- (d) to collect local resources, such as teaching expertise and materials, for retransmission via the CenTeX Tidewater network and for use by other schools participating in the resource-exchange system made possible by the CenTeX network.

In brief, this CenTeX system component literally gives each of the participating school divisions its own broadcasting facility for such services as they wish to generate themselves or to take off the CenTeX microwave network for local distribution. (Most participating school divisions also provide to neighboring school divisions some of the available broadcast time so that these divisions also have the usefulness of both self-generated and network-generated teaching expertise and materials.)

System Number Two: CIT-PEDS: The CenTeX Multi-Media, Multi-Service, Two-Way Network, "from the Atlantic Ocean to Richmond, the Capital City"

Operating on a different set of channels, CenTeX operates a network which begins in Virginia Beach and ends in Richmond. By using a combination of available telecommunications methodologies (microwave, CATV, telephone lines) and privacy-protection circuitry, (plus its mobile station), this network is designed specifically:

- (a) to provide two-way circuits for the delivery of professional training and continuing educational services such as in-service teacher and medical practitioner training; and for remotely delivered medical consultation and diagnostic services; and for social services, such as information and continuing education for teenaged, school students;
- (b) to deliver tuition-based college-level courseware; and
- (c) to enable a single instructor or practitioner from a central point to maintain two-way audio-video (or two-way audio-video out and audio-only return) to any station and/or other distribution component (such as CATV) associated with the multi-media CenTeX matrix of delivery systems. Currently, this system is serving 13 school divisions and 118 school locations.

This network today serves areas having 23.3% of Virginia's total population, 14,436 of its school teachers and 272,717 school-aged

children; and will, when its Backbone is completed, be reaching areas with 34% of Virginia's total population, 20,820 of its teachers and 384,664 of its school-aged children.

System Number Three: The CenTeX CATV Network

With no privacy circuitry restrictions, the CenTeX CATV network today reaches all the CATV subscribers served by Tidewater's major CATV operations (approximately 302,400 persons) and is expected to reach approximately 644,000 persons by mid-1982.

System Number Four: CenTeX's Subcarrier/CATV Broadcasting System for the Sensory-Deprived

By combining the use of the subcarrier of commercial and/or public FM broadcasting stations with CATV FM channels, this network is:

- (a) Virginia's first broadcasting service for visually handicapped;
- (b) Virginia's first broadcasting service for the hearing impaired; and
- (c) the first in America to broadcast via a single FM station the programs required to serve all five of the major sensory-deprived populations (the visually impaired, the hearing impaired, the deaf-blind, the aged and the homebound).

NOTE: None of the above populations include the minimum 5,000 non-Tidewater Virginia teachers which the State Department of Education estimates will view CenTeX tapes and materials distributed by the state tape distribution system; nor those teachers viewing CenTeX tapes via Public Broadcasting Station distribution; nor those teachers viewing CenTeX-produced tapes purchased by non-Virginia-located jurisdictions.

2. CenTeX's Eventual Self-Supporting Capabilities:

52

From its inception, the system goals and strategies for the CenTeX Four-System CIT-PEDS Network have included as one of their objectives the ability to generate its own self-supporting capability.

This economic viability goal still appears practical. In other words, once the CenTeX Tidewater Backbone is completed, this Tidewater-area CenTeX network will generate sufficient user-income:

- (a) to pay for its operation; and
- (b) to pay for the amortization of its equipment.

The preceding projection is based solely on the funds which use of the completed system can save from the current budgets of local schools and two major state agencies which have, in association with CenTeX, made the cost-saving studies on which the preceding projection is based.

3. The Expansion of the CenTeX Multi-Media, Multi-Service, Multi-Origination Point, Privacy-Protectable, Low-Powered, Four-System Network to Benefit Virginia and the Nation:

52

CenTeX studies indicate that, if Virginia is divided into five specific operating areas (one of which is Tidewater), at least three of these five areas can duplicate both the unique, important public services and the economical viability projection which have been a part of the CenTeX four system concept since its initiation in the Commonwealth.

Much of the CenTeX four-system network is, for instance, already being duplicated in other states, including California, Texas and South Carolina.

Let's, therefore, hope Virginia will increase the scope and quality of its educational/medical/social services by having the CenTeX Tidewater Four-System CIT-PEDS Network initiated in all parts of the Commonwealth. The map on the pages following page 52 outlines the recommended next steps designed to establish CIT-PEDS in areas having more than 70% of Virginia's total population.

Following this map is a population analysis chart indicating that this 70% of Virginia's population includes:

- (a) 1,169,011 of Virginia's school children;
- (b) 63,596 of its teaching personnel;
- (c) 58,817 of its health personnel; and
- (d) 4,640,494 of its citizenry.

4. Why the Expansion of the CenTeX Four-System CIT-PEDS Network is So Important to Virginia and the Nation.

53

Previous parts of this report clearly document the usefulness, the learning- and cost-effectiveness of the CenTeX four system CIT-PEDS Network.

But what do those who have funded and used CIT-PEDS believe about its usefulness and its importance?

For funder and user evaluations regarding the usefulness and importance of the CenTeX four-system CIT-PEDS Network, see pages following page 53.

Also, please ask yourself this question: how many federal, and/or state, and/or local school-funded projects are cited and

honored by their pertinent state legislatures for their public-service innovations? (For one such instance, see pages following page 53, which reproduces the Virginia General Assembly's 1980 congratulatory resolution regarding CenTeX's public-service contributions.)

PART ONE

Section I - Your Introduction to the Key Members of the Project SETT-UP Team

Project SETT-UP may well be the most curriculum-and-cost effective, economically viable, user-supported, grant-initiated program ever sponsored by USOE's Bureau of Education for the Handicapped during the decade of the 1970's and early 1980's. The program began on June 1, 1976, officially ended on May 31, 1980, but, thanks to the Virginia State Department of Education, Project SETT-UP is still expanding the productivity and scope of its initial powerful and nationally important objectives.

The Project was initiated by Dr. Herman L. Saettler (then acting director of the Bureau's Division of Personnel Development); managed by John A. Curtis (who developed its technological, management, and other innovative operational concepts); and monitored regularly and very carefully by James T. Micklem, Director of the Virginia Commonwealth's Department of Education, Special Education Division.

As Project SETT-UP got under way, key curricula-development experts, program evaluators, studio production experts, telecommunications system development engineers, fiscal and logistic managers, and system and general management personnel (educational/medical/social-service administrators), and new-funding sources were added to the CenTeX's Project SETT-UP team to provide the coordinated, target-managed interdisciplinary organization which has made possible the very substantial, obviously boastful, but believed accurate content of the first sentence of this report.

These key personnel, funding source additions and contributors included:

A. In the area of curricula development

1. Dr. Louis P. Messier (who headed Project SETT-UP curriculum development, and who took a leave of absence from the faculty of William and Mary's School of Education to meet Project SETT-UP's increasing academic requirements).
2. Dr. Denise DeWald (who has since been appointed CenTeX's Director of Curriculum Development).

B. In the area of program evaluation

1. Dr. Robert O. Brinkerhoff (who, with Dr. Messier, established the initial Project SETT-UP needs assessment criteria and procedures).
2. Dr. Roger R. Ries and Dr. George M. Bass (who are members of William and Mary's School of Education faculty and who have continued to manage as a team all CenTeX "in house" evaluation programs).

C. In the area of statewide academic leadership

1. Dr. George W. Grayson, Jr. (the William and Mary professor who first made Project SETT-UP's objectives a matter of importance to Virginia's General Assembly and has continued to present very effectively the CenTeX concepts before this very important jurisdictional body).
2. Dr. Richard B. Brooks and Dr. Robert Jones (respectively, Dean and Associate Dean, School of Education, William and Mary, who initially directed Project SETT-UP's academic developments).
3. Dr. Albert T. Harris (who replaced Dr. Brooks as CenTeX President during the second year of Project SETT-UP and who, at that time, also became chairman of the Project SETT-UP monthly management review sessions).
4. Mr. Vincent J. Thomas and Mr. Henry W. Tulloch (who, during their sequential terms as presidents of the Virginia State Board of Education, sponsored the expansion of CenTeX's concepts and network).
5. The late Richard Gifford (General Electric's Vice President whose engineering expertise and membership on the State Board of Education brought high-level credibility to CenTeX's programs).
6. Professor Barry Wood (Christopher Newport College, who expedited the Peninsula-area expansion of Project SETT-UP services).
7. Dr. James C. Windsor, President, Christopher Newport College, and Dr. Don Roberts, then Superintendent of the Newport News School Division (who executed the first CenTeX 20-year contract under which the academic entities provide land for CenTeX antenna towers, utilities for station and office operations, and facilities for CenTeX personnel in return for the delivery of Project SETT-UP, and now its successor, special education inservice teacher training programs to its faculties).
8. Dr. George W. Healy (Academic Vice President, William and Mary (who, with the support of his President, Dr. Thomas A. Graves, Jr., approved the cooperative use of the college's facilities and faculties).
9. The leadership of the following school system superintendents facilitated Project SETT-UP's school-level usefulness:

Superintendents

Dr. M. E. Alford
Dr. William A. Anderson
Dr. Albert A. Ayars
Dr. Stephen M. Baker
Brother Barry Barbour

School Division

Portsmouth
Hampton
Norfolk
West Point/King William
Peninsula Catholic

Superintendents

Dr. Edward E. Brickell, Jr.¹
Donald S. Bruno
Oliver C. Greenwood
Sister Mary Ann Nolan²
Dr. Henry A. Renz, III
Dr. Don Roberts
Dr. George H. Stainback
Raymond E. Vernall

School Division

Virginia Beach
York County
Newport News
Walsingham Academy
Williamsburg/James City County
Newport News
West Point/King William
Poquoson

10. CentEX's School Curriculum and Faculty Selection Committee which each year conducts a survey among participating school division teachers and administrators; which, using this grass-root information developed by these surveys, thereafter selects the curricula and instructors for CentEX's in-service special education training programs for the following academic year; which is the key to CentEX's goal of academic excellence and has the following membership:

J. William Etheridge, Chairman
Theodore L. Forte
Fletcher Gray
Dr. Joseph Lyles
Bruce McGuire
Warren Redhair
A. Edward Sutphin
Virginia Turner
Claiborne Winborne

Newport News
Norfolk
Poquoson
Hampton
Virginia Beach
York County
Williamsburg/James City County
Portsmouth
West Point/King William

11. The state-wide curriculum selection and program review committee which James T. Micklem, Virginia Department of Education/Special Education Program Director, established when Project SETT-UP began and which provides the SETT-UP program and its successor programs state-wide consensus regarding the state-wide values which CentEX's academic programs must accomplish. This Committee endeavors to make sure that Project SETT-UP and its successor program, Project ITTS, recognizes state-wide school system requirements, as well as those of the regional and local school divisions directly served by the CentEX network.

¹Dr. Brickell is one of CentEX's pioneer directors; his counsel to CentEX and Project SETT-UP has been significant. In addition to being Superintendent of the Virginia Beach School System, Dr. Brickell is Rector of William and Mary's Board of Visitors and President of the Virginia Association of School Superintendents.

²Dr. Renz was the first school superintendent to support actively CentEX and Project SETT-UP's objectives.

D. In the areas of telecommunications system development

1. Partners Robert L. DuTreil, William C. King, and Jules Cohen, founder of Jules Cohen and Associates
2. Mr. James W. Slate (who was Project SETT-UP's chief engineer during its first years.)
3. Mr. Alan R. Blatecky (who followed Mr. Slate and who is now CenteX's Operations Manager and Associate Project Director of Project SETT-UP's "first-born offspring"---Project ITTS---the Virginia-Commonwealth-funded, continuing expansion of Project SETT-UP's special education in-service teacher training program.)
4. John Saul, EMCEE applications engineer

E. In the area of studio production expertise

1. Mr. J. Scott Wheeler (who has been Director of CenteX's Studio Operations since the second year of Project SETT-UP.)
2. Mr. William G. Wagner (CenteX's Assistant Director of Studio Operations.)

F. In the area of fiscal and logistic management

1. Mr. Stephen D. Harris (who is a founding director of the Center for Excellence, Inc. and who has been CenteX's able treasurer and general legal counsel since its inception.)
2. Mr. Clifford H. Pence, Jr. (until recently, manager of CenteX's fiscal and logistic operations.)
3. Mr. T. Steven Nobles (who recently replaced Mr. Pence as manager of CenteX's fiscal and logistic operations, and who handles all Project SETT-UP school logistic matters.)

G. In the areas of interdisciplinary management; broad knowledge of state-wide needs; and the in-depth operating experience to suggest and evaluate improvement concepts for Virginia's educational, medical and social services.

Most important is the continuing, active top-management and decision-making support provided by CenteX's Board of Directors. This Board is an interdisciplinary group; it includes a representative from every major Virginia public and private entity concerned with the delivery of educational, medical and social services expertise and materials. The knowledge of its Board members saves CenteX thousands of hours and dollars in identifying, defining and establishing services, goals and their relative priorities.

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John A. Curtis (Telecommunications Systems Pioneer; Founder, President and Chief Operations Officer, Center for Excellence, Inc.)

H. In the area of CenTeX's painful, near-death Caesarean birth: the calendar year of 1975.

1. The evaporation of CenTeX's academic support and leadership

Members of William and Mary's School of Education faculty had, beginning in the summer of 1972, effectively aided CenTeX's founder in the development of a sound, academic foundation for the implementation of CenTeX concepts.

2. The total disappearance of William and Mary academic leadership

During the ensuing 2½ years, however, this absolutely essential support evaporated. Perhaps the following events contributed to the disappearance of CenTeX's William and Mary academic assistance:

- (a) Four key proposals submitted by CenTeX to Federal Agencies were either turned down or "backfired."³

³The first of these proposals was submitted to USOE's Facilities Program Branch; the second to USOE's National Institute of Education; the third to BEH's Division of Innovation; the fourth to a BEH Division as joint proposal by CenTeX and another entity having the required academic skills and reputation.

- (b) Virginia's Public Broadcasting Managements and Virginia's Public Television Council not only refused to cooperate with CenTeX (even on the basis of CenTeX-supplied financing) to determine the validity of CenTeX research, but several of the station managers openly stated that CenTeX might get some of their Virginia General Assembly-appropriated appropriations if they did.

This PBS fear and antipathy were catalyzed into anti-CenTeX state policy by the then-existing Virginia State Public Telecommunications Council (VPTC).

- (c) The sudden disappearance of CenTeX's principal academic leader and major William and Mary faculty liaison member, who, due to personal difficulties, unexpectedly left Virginia's Peninsula area.

I. In the area of identifying Project SETT-UP's (and CenTeX's) major unsung heroes

- 1. The actions of Delegate George W. Grayson and the General Assembly's House Education Committee

When Dr. Grayson learned of the PBS/VPTC anti-CenTeX developments, he arranged for CenTeX to address Virginia's General Assembly House Education Committee. Subsequently, a joint House/Senate resolution requested that the Governor instruct the State Department of Education and the Virginia Public Television Council to determine the validity and potential state usefulness of CenTeX's research.

These studies⁴ not only validated the potential state usefulness of CenTeX research, but created affirmative interest in the potentials of CenTeX concepts on the part of the State Special Education Division and its Program Director, James T. Micklem.

- 2. The action of Mr. James T. Micklem

When Mr. Micklem learned of CenTeX's dire need for academic talent to facilitate its continuing proposal-development effort, he arranged for CenTeX to meet with Dr. Dan Payne and Dr. Tom Risinger of the Virginia State Department of Mental Health and Mental Retardation. Both of these executives were directly concerned with MH and MR's personnel training programs. Over a period of several weeks Dr. Payne and Dr. Risinger and Associates studied the CenTeX concepts and the validity of their supporting research. Thereafter, Dr. Risinger suggested that Dr. Paul Jay Fink, Chairman, Department of Psychiatry and Behavioral Science, Eastern Virginia Medical School, might be willing to develop with CenTeX a proposal for the Personnel Preparation Division of the Federal Bureau of Education for the Handicapped.

⁴Copies of these reports follow this page.

3. The actions of Dr. Paul Jay Fink and Terry Salasky

Dr. Fink not only made available the academic expertise and materials for CenTeX's first successful proposal, but he assigned his assistant, Terry Salasky, to get the needs-assessment data which was an equally critically needed input. In addition, Dr. Fink made available the secretarial and other office support services required to type and put together the necessary proposal copies. (CenTeX's founder determined the required needs assessment data, coordinated the proposal's production, developed its telecommunications, business and organization plans, and wrote the copy.)⁵

Thus, "out of the dismal night came the light of life," and Project SETT-UP made possible the adjudication of CenTeX concepts and the complete fulfillment of the project's goals which were the basis of the grantor's funding.

4. The actions of Dr. Herman L. Saettler

Dr. Herman L. Saettler's predecessor (a Dr. Whelan) stated to CenTeX's founder (after BEH awarded CenTeX a grant for Project SETT-UP) that he had written a report stating that he considered CenTeX's telecommunications dynamically innovative, but his question was "whoever heard of some outfit called CenTeX in Williamsburg?"

Dr. Whelan's successor, Dr. Saettler, agreed with Dr. Whelan's high regard for CenTeX's research findings and project concepts, but he fortunately also did his own investigation of CenTeX to determine whether its management merited risking grant dollars. So SETT-UP was not aborted before its birth.

Based on his investigation, and subsequent findings, BEH awarded a grant of \$125,000 to get Project SETT-UP started, and, based on its productivity, have to date invested approximately \$845,000 towards the establishment of a Special Education curriculum-producing-and-distribution operation, servicing a geographic area containing 23.3% of Virginia's total population and 14,436 school teachers.

Fortunately, too, as will be supported by the data in Sections Two and Three of this report, Dr. Saettler's acumen and courage, along with that of the top-echelon members of the Virginia State Department of Education and Board of Education, and the Boards and Superintendents of thirteen Virginia Tidewater-area school divisions, have combined their efforts to make Project SETT-UP what is probably BEH's "most curriculum-and-cost effective" grant-initiated project of the 1970's, as well as a telecommunications system "first."

J. In the areas of new funding sources and Special Education/BEH pertinent services

⁵ Dr. Fink left EVMS about the time BEH made its Project SETT-UP award to go to Hannemann Hospital, which today is providing medical training to Philadelphia-located hospitals via telecommunications.

CentEX's first five years' growth very definitely supports that old (and often accurate) adage, "Nothing breeds success like success." Some of the new CentEX funding sources and services resulting from Project SETT-UP's success are:

(a) From the Federal level:

(1) From HEW (now HHR) (Project SCS)

The Federal Department of Health and Human Resources, already quite knowledgeable regarding the content of telecommunications papers written by CentEX's founder, followed closely CentEX's implementation of its Project SETT-UP obligations.

This HEW performance study resulted in HEW's award of approximately \$250,000 to put into operation an innovative telecommunications distribution system concept designed to provide broadcasting services for the visually impaired, the hearing impaired, the deaf, the blind, the aged and the homebound.⁶

(2) From the Media Branch of the Federal Bureau of Education for the Handicapped (Project HITT)

Another major award (approximately \$200,000) came to CentEX from BEH's Media Division. This award, providing services to unwed teenaged mothers, gave CentEX its first experience in the use of its two-way telecommunications delivery system for medical, as well as educational training and further provided CentEX another opportunity to demonstrate that its two-way mobile-fixed station can be significantly and economically useful in the distribution of medical diagnostic and training services...wherever and whenever needed.

(3) From the National Telecommunications and Information Agency of the U.S. Department of Commerce (Construction Grant)

An award of \$300,000 from this agency has enabled CentEX to extend its delivery system for the first time into Tidewater's "needy" rural areas. These dollars, plus locally supplied dollars, have enabled CentEX to build stations in West Point and Central Garage, Virginia.

(4) From BEH's Gifted and Talented Office (Project GETT-UP)

Two awards, totalling approximately \$170,000, enabled CentEX to implement its first effort in this

⁶This system concept was one component of a multi-media, multi-service telecommunications delivery system concept paper submitted in 1974 to Dr. Albert Horley, Director of HEW's Telecommunications Policy Office, by CentEX's founder.

educationally important program and enabled CenTeX to attract the nation's foremost inservice teacher training authorities in this field.

Virginia's Director of Teacher Training has estimated that at least 5,000 Virginia teachers will view this taped series during the next five-year period.⁷

Tapes made under the first GETT-UP contract, and selling for \$4,125 per set, have been sold only on the basis of word-of-mouth to a number of state educational authorities as far away as Alaska, Idaho and Missouri.

Thus, all of the major populations for which BEH is responsible have and are continuing to be served by projects which the network built by the cooperative federal/state/local school-funded Project SETT-UP, which has been synergistically created and made economically practical.

(b) From state and local entities

(1) The Virginia Department of Visually Handicapped/United Way

The Virginia State Department of the Visually Handicapped and the Williamsburg United Way fund, despite budget cutbacks, have replaced the federal government as the primary funding source for CenTeX's broadcasting services for the sensory-deprived.

(2) The State Department of Telecommunications

Mr. George L. Hall, Director of the Virginia Commonwealth Department of Telecommunications, attended a recent CenTeX Executive Committee meeting to state that his budget for the next Virginia biennium (which begins on July 1, 1982) would include the following funding for CenTeX:

- a. \$160,000 for each of the two biennium years (against CenTeX's annual operating costs of \$310,000⁸ and ⁹ for network operations and amortization requirements).
- b. \$25,000 per year for the operation of CenTeX's broadcasting services for the sensory-deprived (against the total annual requirements of \$50,000⁸ per year).

⁷The income of dollars received from the sale of these tapes, less CenTeX's costs in making and distributing them, is accumulated in a special account which can only be used to update the tape content and supporting materials and to provide the equipment therefor.

⁸Does not include the costs of CenTeX's facilities and utilities now being defrayed by thirteen participating school divisions.

⁹Does not include the costs of curriculum development and production; nor the costs of telecommunications system and equipment applications research and development; nor the expansion of the CenTeX multi-media, multi-services network.

K. In the area of current bottom-line funding

1. It is the goal of all federal grant programs to fund activities which will demonstrate the worthiness of innovative concepts to the point where they attract the local and state funding required for their continuing operational life and public service contributions.
2. Based on their own evaluations of Project SETT-UP's academic usefulness and the evaluation reports of state-employed faculty members from the University of Virginia and the Virginia Polytechnic and State University Schools of Education, the managements and boards of the schools participating in Project SETT-UP and the Virginia State Department of Education have combined their pertinent academic capabilities and funding resources to intensify the productivity of the Project SETT-UP concept and to extend the geographic scope of its usefulness.
3. Under the terms of 20-year contracts, for instance, the participating school divisions provide, without cost to CenTeX, the land for CenTeX telecommunications towers and equipments; the facilities for CenTeX personnel; the space, the power and other utilities required by the CenTeX operations in return for three hours per day use of the stations located on their respective properties. (The school divisions, their superintendents and their academic officers who have made this cooperative effort a practical reality have been listed in Section I, page 3.)
4. The Virginia Department of Education has matched this substantial school division facilities and personnel contribution by providing the dollars necessary for the continuing development of survey-determined special education curricula needs and the means by which the distribution of the produced curriculum can be made available on an easy-access, economically viable, continuing basis to all Virginia school divisions, administrators and teachers.
5. The Virginia State Department of Education executives directly responsible for this funding support so critical to special education in Virginia and to the continued operation of CenTeX are:
 - (a) Dr. S. John Davis, Superintendent of Public Instruction
 - (b) Dr. Carl L. Riehm, Assistant Superintendent/Curriculum
 - (c) Dr. Everett B. Howerton, Jr., Assistant Superintendent for Personnel and Field Services
 - (d) Dr. William C. Boshier and his successor, Dr. Wendell Helton, State Director for Inservice Teacher Training
 - (e) Dr. N. Grant Tubbs, State Director for Special and Compensatory Education
 - (f) Dr. Austin Tuning, Director of Special Education Administration and Finance
 - (g) Mr. James T. Micklem, Director of Special Education Programs who headed the 1975 Virginia Department of Education Task Force, established at the request of Virginia General Assembly,

to evaluate the educational values of CenTeX research, and without whose initial and continuing support Project SETT-UP would never have been initiated.

- (h) Mary Elizabeth Dalton, Director of Telecommunications Services, State Department of Education, whose direction and program contributions have been major factors in the implementation of CenTeX's Education for the Whole Family concept.

- L. In the area of summarizing the personnel capabilities, the resources (including funding) and the organization which have made the innovative SETT-UP concept a real-life entity

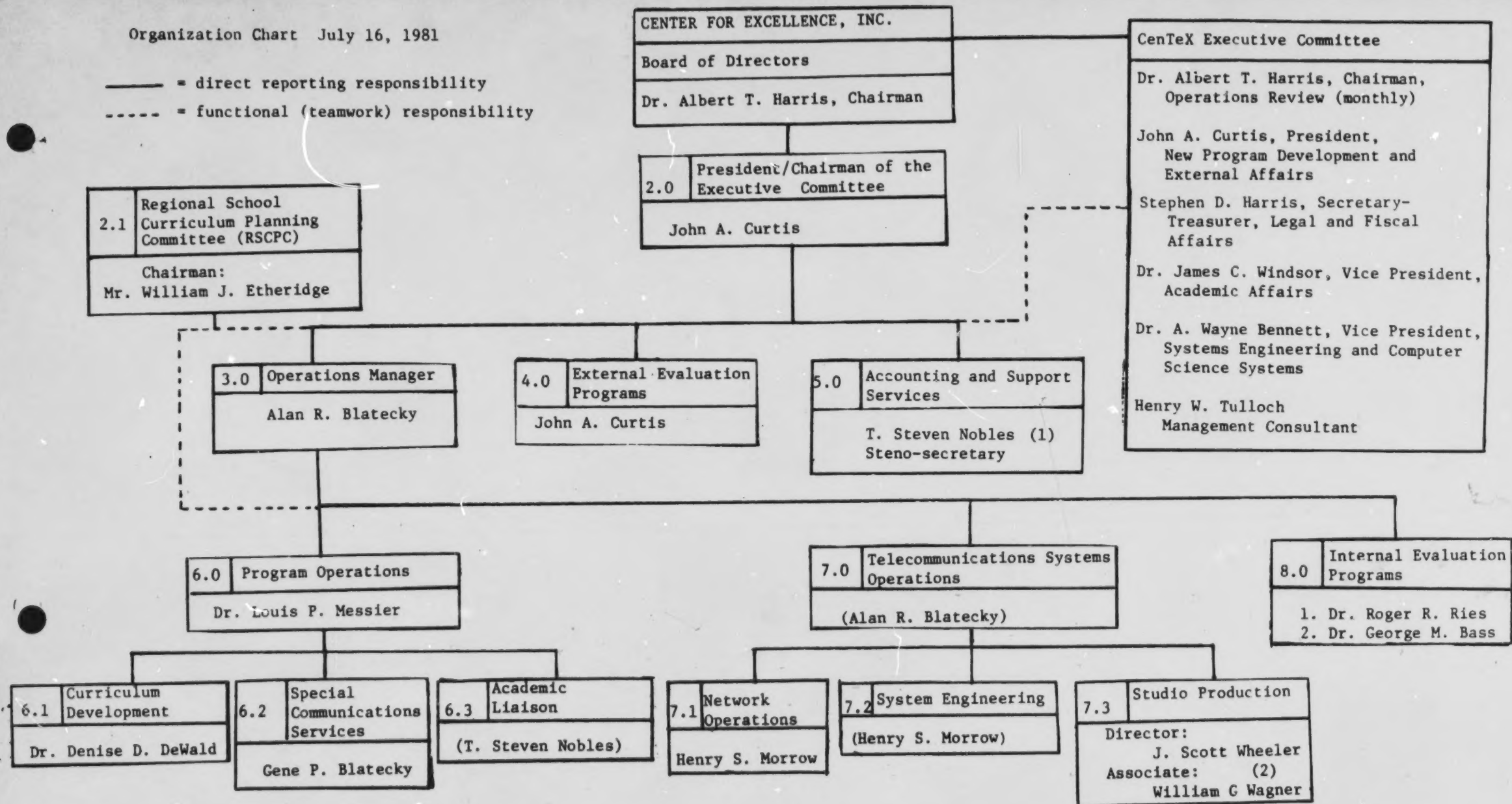
Immediately following this Section I are two items:

1. a copy of CenTeX's current organization chart; and
2. a copy of CenTeX's first organizational brochure, published in October, 1980, and summarizing the five CenTeX years during which Project SETT-UP pioneered a new dimension in Special Education Teacher Training and developed what this paper believes is the most cost-effective tool yet made available to implement the mandates of Congress's 94-142 on timely and economically reasonable bases.

Now this report must face the 64-dollar question: did Project SETT-UP meet the pre-project concepts of its originator and the expectations of those whose capabilities and resources have turned these concepts into an active operation? Section II will try to answer this critical question.

Organization Chart July 16, 1981

—— = direct reporting responsibility
 ----- = functional (teamwork) responsibility



Notes:

- (1) Reports to Corporate Treasurer and President regarding fiscal matters and corporate assets
- (2) Acts as Operations Manager in absence of Mr. Blatecky
- (3) Total Personnel Roster: 10 full-time; 14 part-time including accountant, inservice faculty, evaluators and studio technicians.

Center For Excellence, Inc.



The New Dimension in
Medical
Educational
Social Services

INTERACTIVE TELECOMMUNICATIONS



It has taken more than 370 years (from the founding of Jamestown) and a number of farsighted legislative acts and judicial decisions to create our nation's comprehensive educational system and to come nearer to meeting our farsighted egalitarian educational standards. We still have far to go, however. Costs of education continue to spiral upwards, and voluntary support of public education is decreasing as these costs rise. Without more effective use of its educational resources, the nation may be unable to continue its long struggle for equal access to education for all its citizens.

One of the most promising ways to increase the geographic scope and effectiveness of America's educational processes appears to be the use of modern telecommunications.

There are currently six major telecommunications methods delivering educational, medical and social services every day to major segments of the population:

- Public Broadcasting (radio and television)
- Instructional Television Fixed Service (ITFS)
- Teleconferencing — Telewriting (via standard telephone circuits)
- FM-Broadcasting Station Subcarrier Multiplexing
- Cable Television (CATV)
- Satellite Circuitry

Although very different in equipment, procedures and costs, these six telecommunications methods have one common denominator: they can all break the shackles of geography and time — factors that drastically limit access to most services and increase their costs. Telecommunications enables educators to deliver services where and when the consumers, not the manufacturers, want to buy and use them, and to do so at a very low cost.

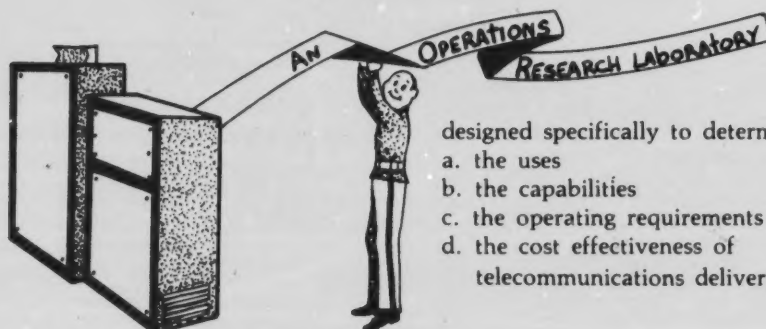
I founded the Center for Excellence, Inc. (CenTeX) in 1973 to research the effectiveness of these six telecommunications methods and to create, for the first time, an organization that both developed appropriate educational, medical and social programming and then delivered it via the most effective telecommunications method.

In Tidewater Virginia, CenTeX has demonstrated the operation of a telecommunications delivery system which can be readily duplicated throughout Virginia and the other 47 contiguous states with the same effective learning and practical cost results.

John A. Curtis
Founder and President
The Center for Excellence, Inc.
Williamsburg, Virginia

CenTeX Is:

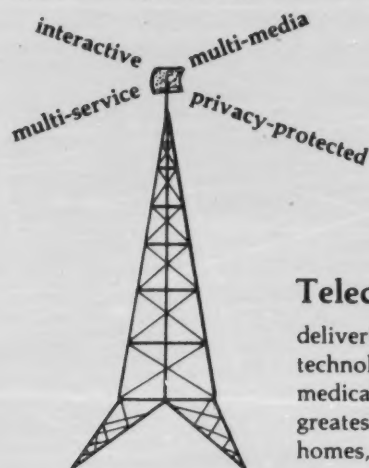
A Research and Resource Development Corporation



designed specifically to determine

- a. the uses
- b. the capabilities
- c. the operating requirements and
- d. the cost effectiveness of telecommunications delivery systems

The designer and operator of America's first



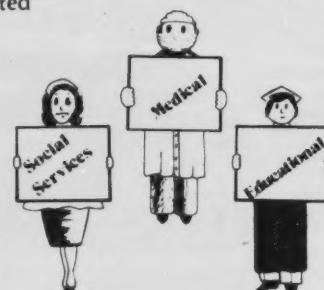
Telecommunications Network Operation

delivering and exchanging expertise through modern electronic technologies to increase the teaching effectiveness of educational, medical and social services in those areas where there are the greatest unmet needs and to distribute them to remotely located homes, classrooms, hospitals, social centers, offices and factories.

CIT-PEDS

CenTeX's Comprehensive, Interactive Telecommunications Privacy-Protected Educational/Medical/Social Services Delivery System uses four of the six telecommunications methods: Instructional Television Fixed Service (ITFS), standard common-carrier telephone lines, FM-Station subcarrier multiplexed circuitry and cable television, and is preparing to use a fifth: satellite hook-up. It is now in operation in Tidewater Virginia.

The Center for Excellence, Inc., founded in 1973, is an IRS approved, non-profit, Virginia-chartered corporation. P.O. Box 158, Williamsburg, Virginia 23185 804-229-8541 October © 1980



The Center for Excellence, Inc.

A professor lectures in a television studio. His students are school teachers, gathered in classrooms five to 50 miles away. Everyone can talk to the professor and to each other. They can all participate in discussion.

A community volunteer reads items from the local newspaper into a microphone. The blind listen at home on a special radio; the deaf read it on a teletype machine; the deaf-blind read it on a Braille machine.

These projects (both the programming and the technology) were developed by the Center for Excellence, Inc. (CenTeX), a research and resource development corporation in telecommunications programming and technology.

The CenTeX laboratory is designed to determine the uses, the capabilities, the operating requirements and the cost effectiveness of telecommunications delivery systems. As a result of this research, CenTeX has designed and now operates America's first interactive, multi-media, multi-service, privacy-protected telecommunications delivery system, which can distribute educational, medical and social services to remotely located homes, classrooms, hospitals, social centers, offices and factories at times convenient to the consumers of these services.

CenTeX was founded in 1973 by John A. Curtis, a pioneer in railway and highway communications systems and computer-center service operations.

The first three years were spent on basic research, using \$150,000 in private funds, to identify the disciplines, user needs, technology and economic and geographic factors necessary to implement the CenTeX program.

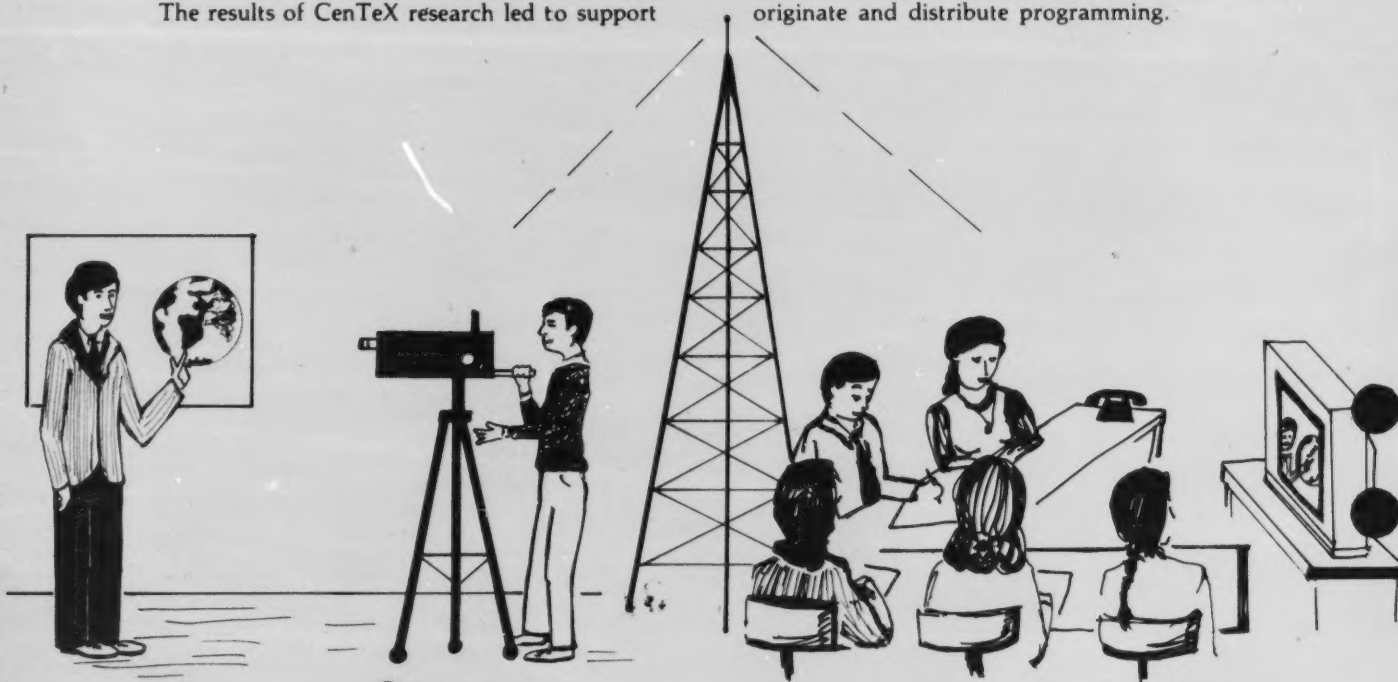
The results of CenTeX research led to support

from Virginia's General Assembly in 1975 and to financial assistance from the Division of Personnel Preparation of the federal Bureau of Education for the Handicapped in June 1976.

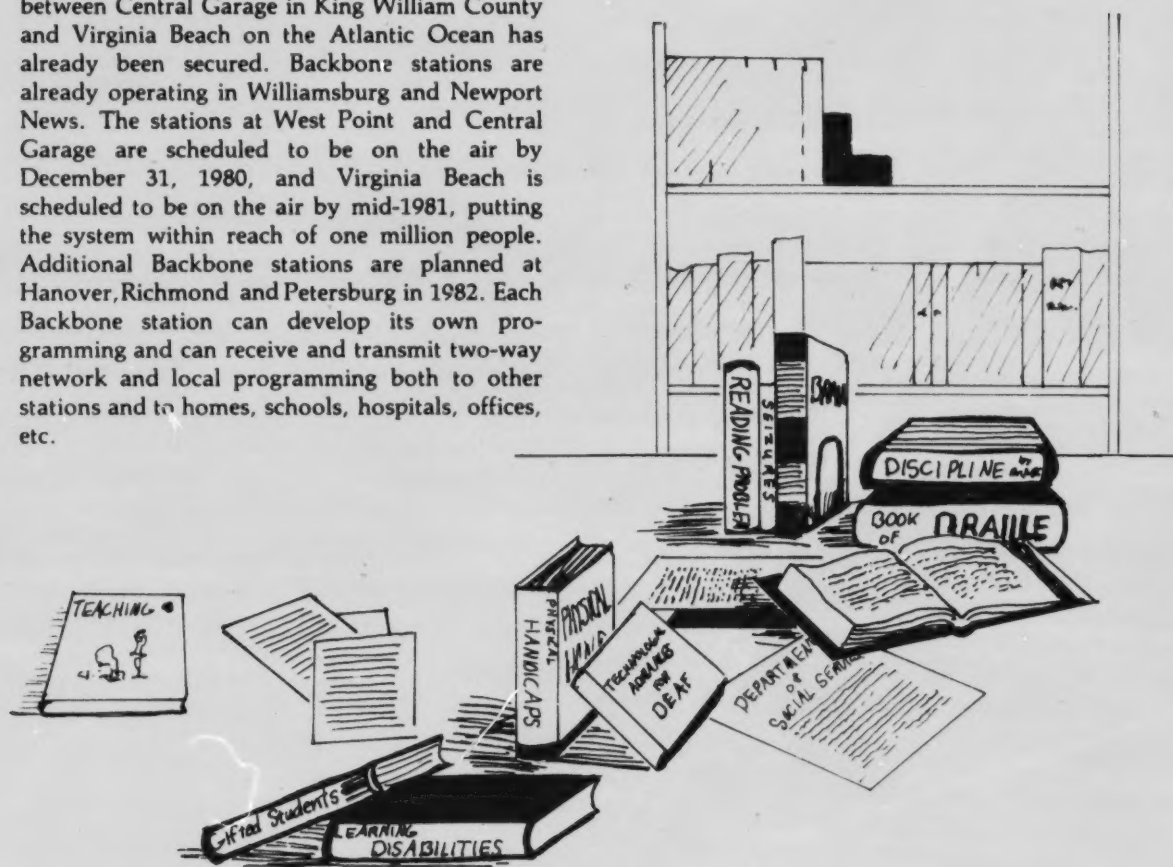
Since then CenTeX has received more than \$3.7 million for research, program planning and equipment from local school divisions, universities, and state and federal agencies. Its telecommunications equipment is valued at \$1.5 million, and its network is being expanded according to a carefully engineered and scheduled plan.

CenTeX has been on the air since February 1978 and is now providing inservice training for teachers of the handicapped and gifted; audio, teletype and Braille broadcast services to the blind, the deaf, and the deaf-blind, the homebound and the aged, and special medical and social instruction.

Programming is delivered via CIT-PEDS (The CenTeX Comprehensive Interactive Telecommunications Privacy Protected Educational/Medical/Social Services Delivery System). This system has two-way capability, is multichannel, privacy-protected, requires low power, offers a variety of media — from television to computer transmission — and uses network stations both to originate and distribute programming.



Funding to complete the portion of the Tidewater Backbone of the CIT-PEDS Network between Central Garage in King William County and Virginia Beach on the Atlantic Ocean has already been secured. Backbone stations are already operating in Williamsburg and Newport News. The stations at West Point and Central Garage are scheduled to be on the air by December 31, 1980, and Virginia Beach is scheduled to be on the air by mid-1981, putting the system within reach of one million people. Additional Backbone stations are planned at Hanover, Richmond and Petersburg in 1982. Each Backbone station can develop its own programming and can receive and transmit two-way network and local programming both to other stations and to homes, schools, hospitals, offices, etc.



A series of nine overlapping Rib stations is planned to bring this programming to rural areas within 100 miles of the Backbone network.

A planned satellite hook-up would connect the CenTeX CIT-PEDS Network with telecommunications networks across the United States, Canada and part of Mexico.

Virginia's Tidewater area was chosen for CenTeX activities because its socio-economic factors make it a microcosm for other regional, state and national population areas. Thus, what works in Tidewater can be replicated elsewhere.

CenTeX's first step was to survey Tidewater's unmet educational, medical and social needs. Survey results identified the following needs upon which CenTeX has concentrated its program development:

- Continuing inservice professional training (special inservice training for public school teachers; continuing professional updating for psychiatrists, psychologists, medical doctors and

nurses, especially those in general practice and/or practicing in rural areas).

- Specialized broadcast services for sensory deprived populations (the blind, the deaf, the deaf-blind, the homebound, the aged).

- Special programs for above- or below-average public school pupils (special 3-R tutoring programs and special programs for the gifted and talented).

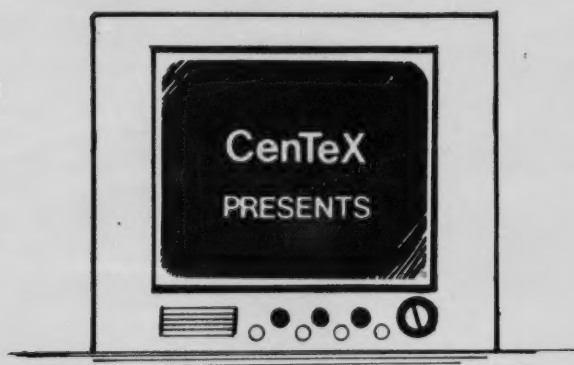
- Postgraduate education and consultation services (advanced degree courses; engineering and medical consultation regarding unusual problems of general practitioners; diagnostic/prescriptive services to the home or other remote location by groups of specialists).

- Special population services (continuing education/medical instruction for teenaged, unwed mothers; continuing education to temporarily or permanently homebound students; retraining of the unemployed; individualized physical rehabilitation, and mental health services).

CenTeX also identified the basic technical specifications for a successful multi-media, multi-service telecommunications delivery system:

- **Analog/Digital capability.** Analog circuits for television and digital circuits for hard-copy transmission.

- **Two-way capability** — live interchange between instructor and student. This is accomplished with one-way audio-video with a return audio-only capability or by the more costly, but also more effective, two-way audio-video capability. In some instances, such as teaching medical subjects, making diagnostic/prescriptive medical and psychological analyses, it is essential that both parties to the communications both see and hear each other.



- **Easy access** to production facilities and the ability of each station to do its own programming to suit its own needs.

- **Twenty-four-hour availability.** Only by operating between 6 a.m. and 10 p.m. can the system hope to meet America's unfilled educational needs at a cost efficient level. And some medical and industrial training requires around-the-clock programming.

- **Multiple Channels** to permit simultaneous broadcasting of various programs.

- **Privacy Protection**, both for tuition-paying programs and for those programs, such as psychiatric treatment or medical diagnosis, where privacy is essential. The Federal Communications Commission has applied the privacy restrictions of the 1934 Communications Act to ITFS systems.

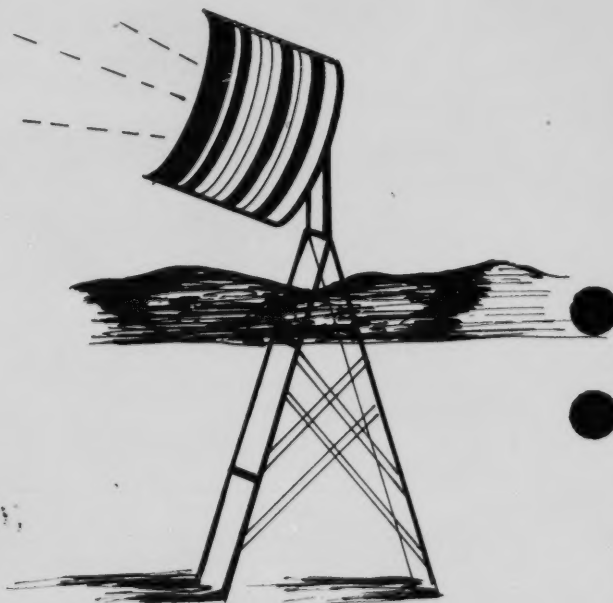
- **Economically Practical.** This means, when feasible, using existing telecommunications facilities to minimize costs of equipment, installation and maintenance and concentrating on low-powered equipment to keep energy costs around \$1,000 a year per station (rather than the 100 times larger \$100,000 a year which many commercial and public broadcasting systems pay).



There are six telecommunications methods in use today:

- **Public Broadcasting** — As a distributor of general, cultural educational programming (rather than structured, needs-based programming), public television probably has no equal in the educational TV field. It lacks, however, the privacy-protection, and the multi-channel and the two-way capabilities of both ITFS and cable systems, and its services are costly.

- **Instructional Television Fixed Service** — ITFS has 28 6-MegaHertz television channels set aside by the Federal Communications Commission in 1971 for the exclusive distribution of non-profit educational instructional materials. It is privacy-protected, can make available 14 channels for simultaneous use in every school district in the U.S., uses low power, can be two-way audio-video, has relatively simple technical skill requirements, can provide both digital and analog circuits, and makes possible low production and operating costs.



- **Standard Common-Carrier Telephone Lines** — Telephone lines are available, privacy-protected and multi-channel. But most standard circuits are narrow-band and analog, making them inefficient for the transmission of real-time TV and hard-copy data. The circuitry is adequate for audio-only return circuit use, except when long distance rates become a factor.

- **FM-Station Subcarrier Multiplexed Circuitry** —The use of subcarrier circuitry appears to be the least expensive way to serve the blind, the deaf, the deaf-blind, the aged and the homebound who require special formats to receive broadcast services.



- **Cable Television** — Where available, this multi-channel local distribution method can be the least expensive way to distribute one-way educational programming. When connected via a satellite system this method becomes an effective component (as does ITFS) of a national educational telecommunications network. Properly engineered, CATV circuits can be privacy protected. The multi-channel capability makes its costs comparable, and sometimes even superior, to those of ITFS systems. CATV today, however, reaches only 25% of the nation's population, but there is a growing trend toward two-way use of CATV systems in urban areas.

- **Satellite Circuitry** — Since satellite circuitry requires six times the frequency spectrum, is

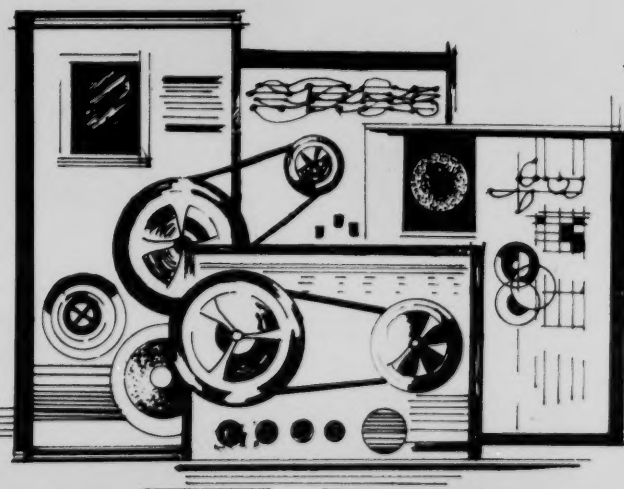


channel-limited, and usually is many times more costly than earthbound ITFS and CATV circuits for local and regional programming, it is probably only cost effective when used for long distance connections between ground-based regional and local telecommunications systems. Satellite systems, when properly engineered, can be privacy-protected. The number of down-receive satellite earth stations is, however, doubling each year and costs are approximately 1/5 of five years ago.

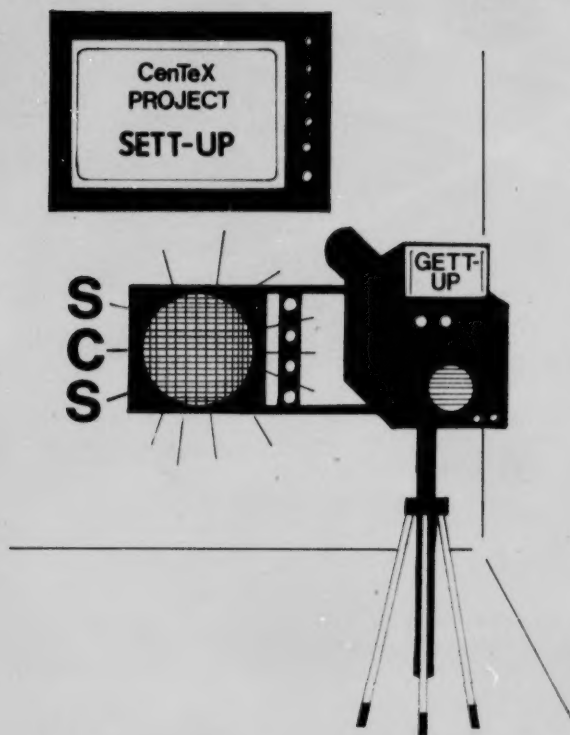
CenTeX's CIT-PEDS Network is built primarily around the ITFS station, which offers live and video-taped programming as well as access to computers and data banks. It uses telephone circuits for audio-only return to its television programming; FM-station subcarriers for its programming for the blind, the deaf, the deaf-blind, the aged and the homebound, and local CATV systems for instructional services.

A satellite earth station is planned at Williamsburg to permit the CenTeX Tidewater system to connect with other telecommunications systems around the country.

Because it does not provide multi-channel, privacy-protected circuits, public television is the only telecommunications method not regularly used by CenTeX.



Services



Project SETT-UP (Special Education via Telecommunications — Teacher Upgrade) was the first federally-funded project to demonstrate CenTeX's two-way audio-video capability. CenTeX spent a year on staff training, curriculum development, equipment installation and the pilot-testing of programs before SETT-UP began broadcasting in February 1978 to public and private schools in the Williamsburg area. Part of the preparation included the development of a training system, called "Four Eyes," in which instructors test material, delivery and audience reaction and assess over-the-air teaching effectiveness. This self-training system enables instructors to learn quickly the basics of teaching over television.

Each semester Project SETT-UP delivers six inservice courses to teachers in the area of special education. No longer a demonstration project, Project SETT-UP's courses are now financed by state funds for inservice teacher training.

Project GETT-UP (Gifted Education via Telecommunications — Teacher Upgrade) offers weekly three-hour seminars for teachers by nationally recognized experts in the field of gifted and talented education. Videocassettes of the first semester's broadcasts are available for distribution throughout the state by the Virginia Department of Education and throughout the nation by CenTeX.

These courses are broadcast via the CIT-PEDS Network before and after school to teachers gathered at more than 90 remotely located classrooms.

Courses in both projects carry credit toward teacher recertification and some have graduate credit from the College of William and Mary and other colleges.

Project SCS (Special Communications Services) is an ongoing program to bring information, education and assistance into the homes of the blind, the deaf, the deaf-blind, the aged and the homebound using FM-station subcarriers. CenTeX distributes special audio receivers to the blind, to the deaf to operate teletypes, and to the deaf-blind to operate Braille machines.

Broadcasting to the sensory-deprived began in June 1978 and uses more than 45 community volunteers to read newspapers, serialize books and make community announcements.

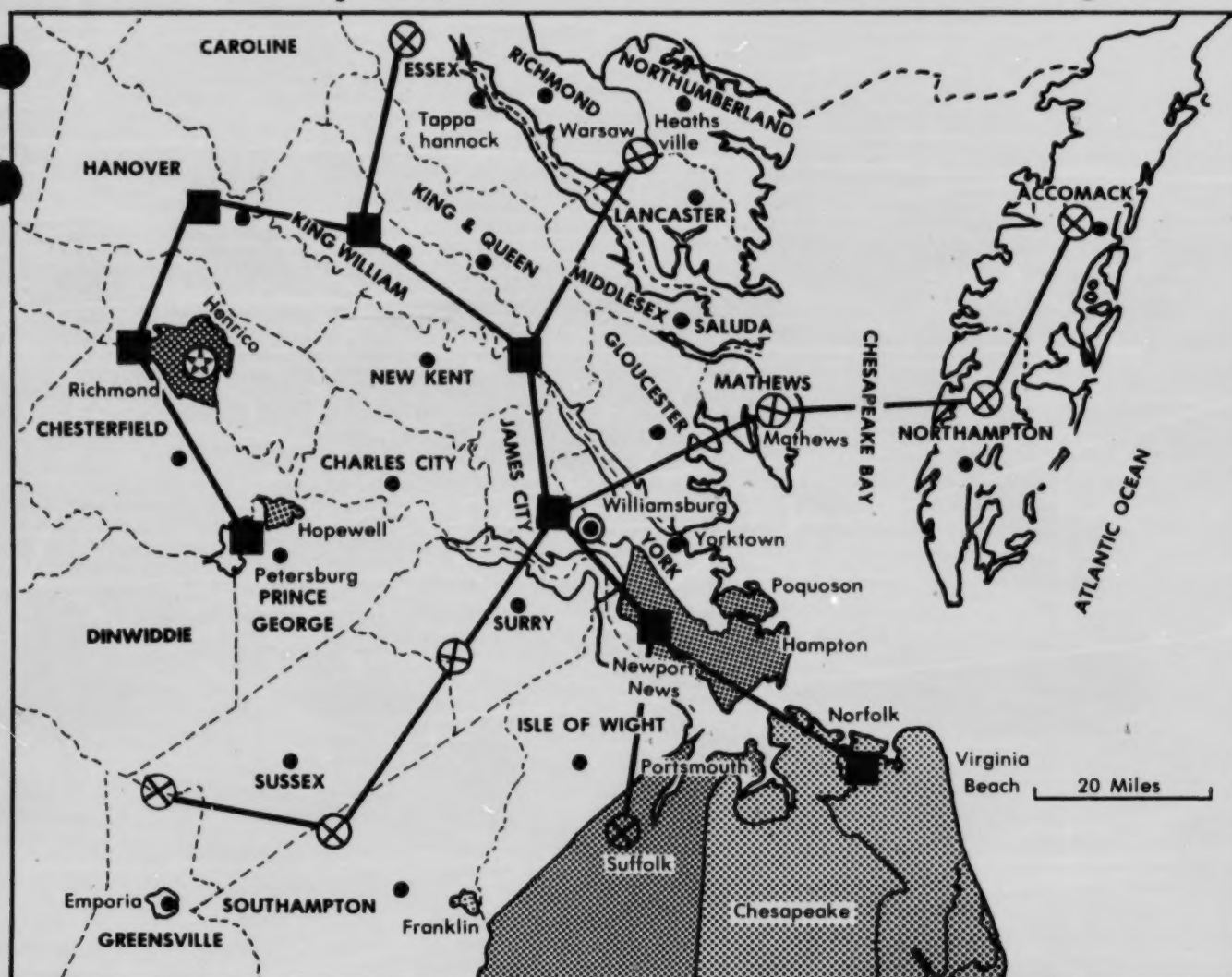
CenTeX broadcasts to the blind from 7 a.m. to early afternoon and again from 5:15 p.m. to 10 p.m. Monday through Friday and to the deaf from 7 p.m. to 7:30 p.m. Monday through Friday. Weekend broadcasting is from 7 a.m. to 12:30 p.m. Saturday and Sunday.

CenTeX is continually investigating new programs to meet educational, medical and social needs through telecommunications while local school divisions are also planning ways to use local station broadcast time. Some local school plans for the CIT-PEDS Network include telecast of speakers, outstanding classroom programs, administrative announcements, rebroadcast of public television programs, computer access and data acquisition networking, instruction in foreign language, drug education, adult education, parent training and fine arts presentations.

The program application of CenTeX ideas is limited only by the imagination. The technology it has developed is easily duplicated throughout Virginia and the other 47 contiguous states.

CenTeX also saw the need for operators of the nation's telecommunications delivery systems to get together to exchange information and assistance. So in 1978, CenTeX founded the National Instructional Telecommunications Council, Inc. Its membership now includes half of the 82 non-profit ITFS, user-supported system operators (including those of such major universities as Harvard, Stanford, Emory, Wayne State Universities, and the Universities of Southern California, California and Texas, as well as urban and suburban school systems across the country).

CenTeX Operations in Tidewater Virginia



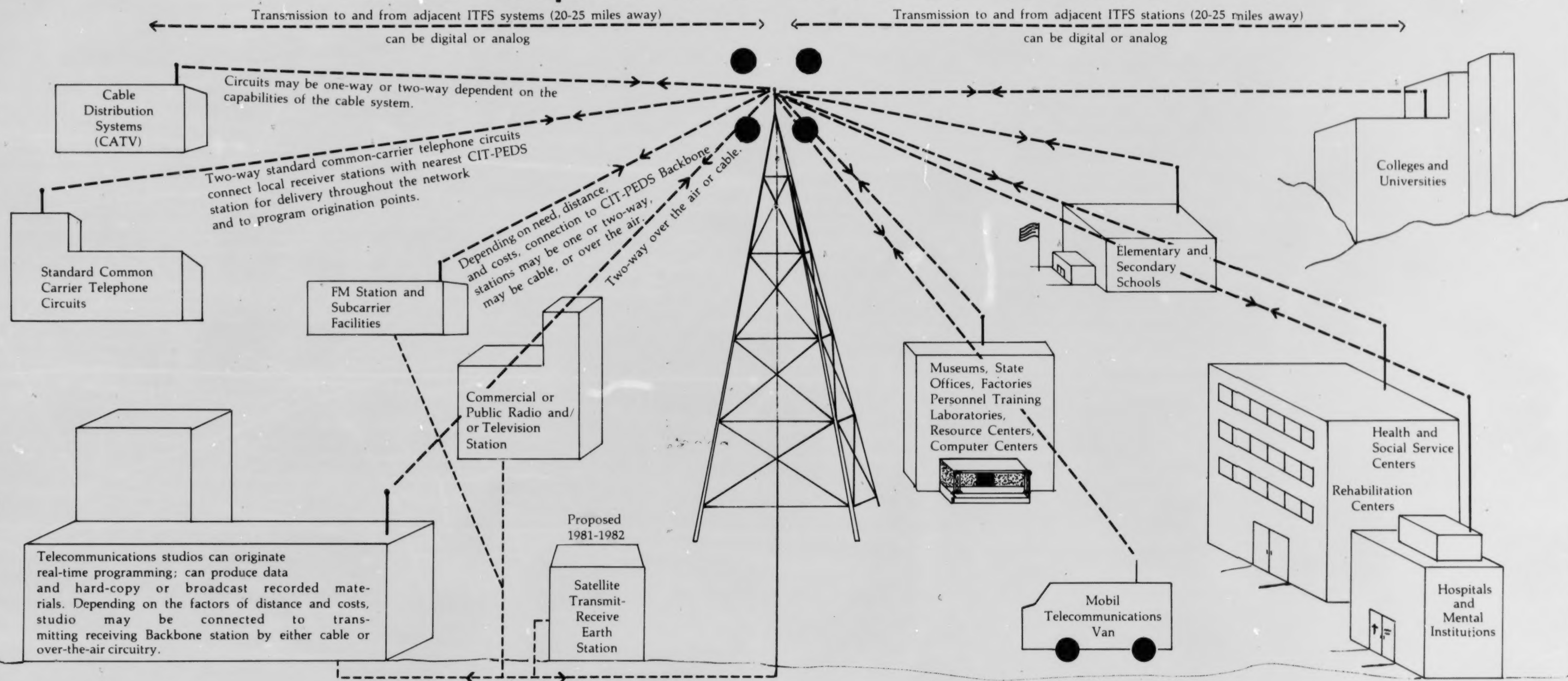
The core of CenTeX's CIT-PEDS Network (Comprehensive, Interactive Telecommunications Privacy Protected Educational/Medical/Social Services Distribution System) is eight Backbone stations, each designed to both receive and distribute network and locally produced programming over a radius of 20 miles. The stations at Williamsburg and Newport News are in operation. King William and West Point are scheduled to go on the air by December 31, 1980, and Virginia Beach by mid-1981. The final three

Backbone stations, scheduled for completion in 1982, will be at Hanover, Richmond, and Petersburg.

A series of nine connecting Rib stations is planned to bring programming to rural areas in a 100-mile radius of the Backbone network.

The complete CIT-PEDS network will blanket eastern Virginia, an area of 7,300 square miles with a population of more than one million persons, with CenTeX services.

The Basic Component of the CenTeX CIT-PEDS Network



- The basic component of the CenTeX CIT-PEDS Network is the local ITFS station. Locally controlled, it has two-way capability, is multi-channel, privacy-protected, is low power (10-50 watts), and can carry analog transmission for television programming and digital transmission for hard-copy print-out, computational services, and data bank access.

- The larger Backbone stations develop all network programming for distribution to other Backbone stations and associated Rib stations which beam it to rural areas. However, both Backbone and Rib stations can develop programming for their immediate broadcast areas.

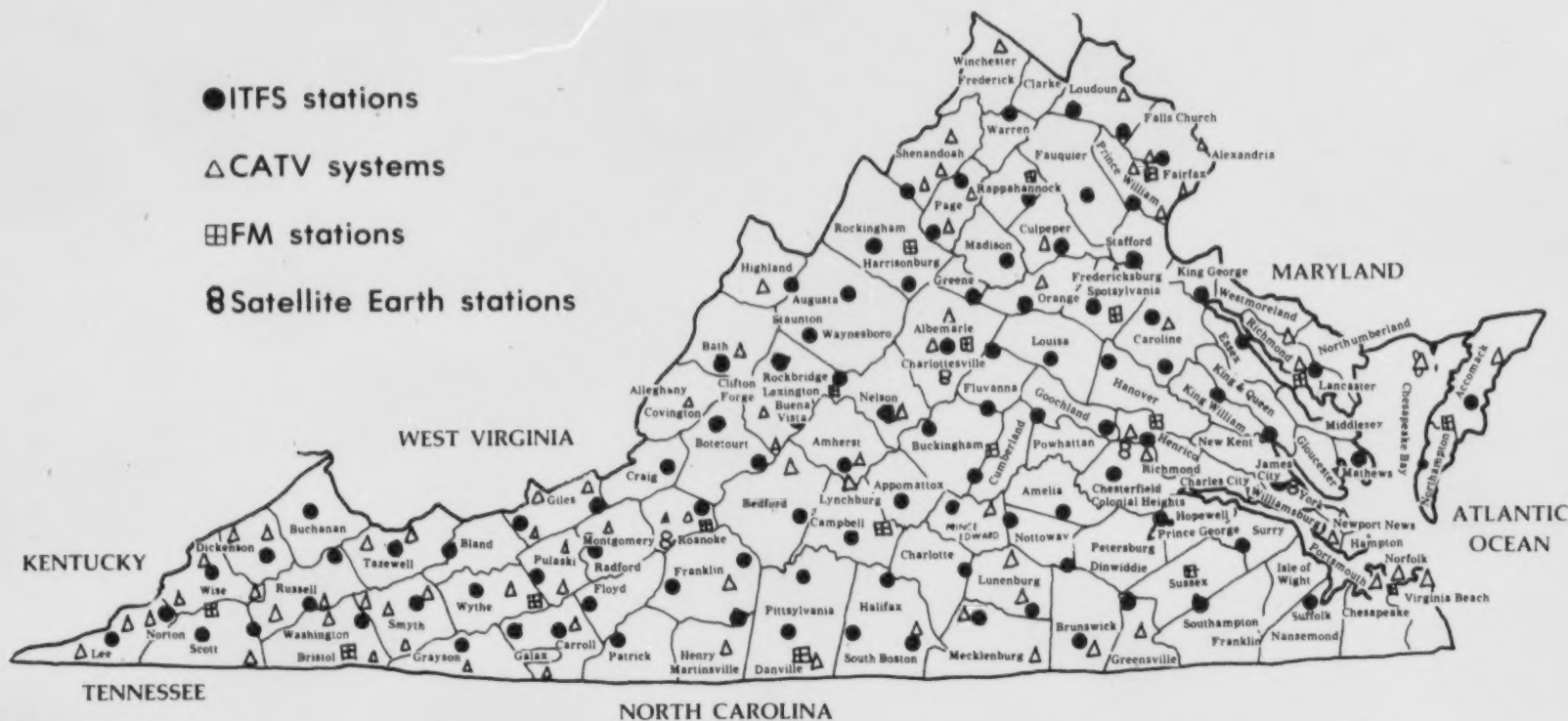
- Each ITFS station can distribute directly over the air to and from remote locations within its 20-mile service area, and to other telecommunications delivery systems where available and practical (CATV, telephone lines, FM subcarriers and satellite networks).

- The local station also acts as a relay station, receiving and transmitting two-way programming from and to adjacent Backbone and Rib stations 20 miles away.

- Return circuits to stations are either audio or audio-video.

- The mobile telecommunications van provides two-way interactive telecommunications between 'temporary' locations (such as homes, laboratories, hospitals, schools, offices, health and social centers, rehabilitation centers and disaster and accident locations) and a Backbone station within 15 miles.

Commonwealth of Virginia



CenTeX has paper engineered the extension of the CIT-PEDS Network throughout Virginia to demonstrate its practicality. The map shows where various components of the CIT-PEDS Network could be located and connected with existing cable television and FM radio stations if the system were extended. Since Virginia's terrain includes mountains, rolling hills and flat-land areas, others could replicate the CIT-PEDS Network design and costs elsewhere in Virginia or in the other 47 contiguous states.

Evaluation is a Crucial Tool

CenTeX has a three-phase test and evaluation procedure for its projects. Members of its evaluation team participate from 'day one,' even during the project planning stages. They work alongside the project director and sum up results at the end of the project.

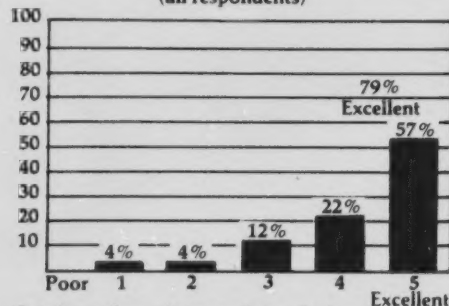
The evaluation survey methods and project check-points are critiqued by nationally respected, outside experts and members of the pertinent CenTeX advisory boards both before implementation and after the final project results have been analyzed.

The following look at Project SETT-UP (Special Education via Telecommunications: Teacher Upgrade) is typical of CenTeX evaluation efforts.

Project SETT-UP began broadcasting six one-hour courses in special education in Spring 1978. The courses offered credit toward renewal of teaching certificates and later one college-credit course was added each semester.

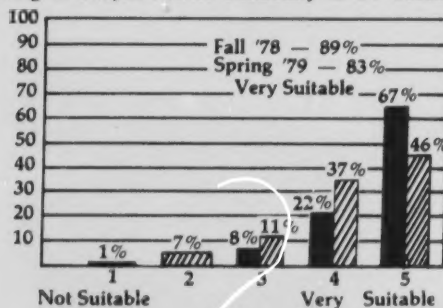
For the first three semesters the courses were available to 10 schools in the Williamsburg area (Williamsburg-James City County, Magruder Elementary in York County, Walsingham Academy, Jamestown Academy and the Eastern State Hospital school). Of the 338 teachers, 71.9% took one or more courses during the three semesters. Total course enrollment was 387.

Rating of Overall Quality of Inservice Courses
(all respondents)



Total number of respondents during project: 255

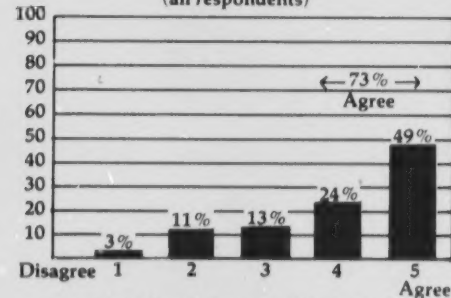
Rating of Subject Matter Suitability to TV Teaching



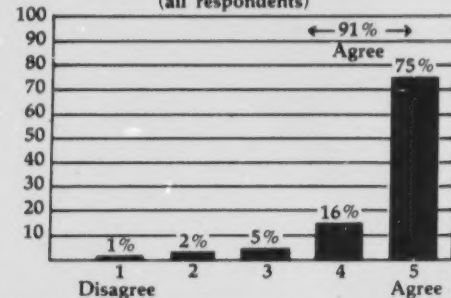
Number of respondents: Fall 1978 83, Spring 1979 46

NOTE: Percentages do not add up to 100% due to rounding.

Belief That It Is Easy to Interact with the Instructor
(all respondents)



Belief That Television Holds Real Promise As Training Device
(all respondents)



Total Number of respondents during project: 255

NOTE: Percentage does not add up to 100% due to rounding.

During late 1979, the lower Peninsula (Newport News, Hampton, Poquoson, lower York County and Peninsula Catholic High School) was added to the service area, giving a potential of 4,489 teacher participants. Evaluation studies for the entire Peninsula are currently being established.

Quizzes and questionnaires enabled the instructors to evaluate and, if necessary adapt, the courses while still underway.

The evaluators looked at format, content and effectiveness, all with an eye toward improving the project.

Eight courses during the first three semesters were evaluated by using tests before and after the courses to measure increase in knowledge. In six of the courses (75%) students showed a significant gain.

Evaluation also showed that two-way audio-video delivery systems were more effective than one-way systems. Of the students served by two-way circuits, 78.1% received A's and B's compared to only 60% of those served by one-way circuits. There were no drop-outs among the 'two-way' student bodies, but the 'one-way' student body had a drop-out rate of 23.1%.

Students were also asked to assess their satisfaction with the course content and the telecommunications delivery system. The answers were overwhelmingly positive.

"...no limits on what this kind of operation can do given modest amounts of financial support and sufficient encouragement from governmental agencies and consumers.

"It must be apparent that small school systems with limited resources have difficulty providing inservice education, especially to the small numbers represented by teachers of exceptional children. CenTeX effectively and efficiently solves many of the problems which would otherwise be experienced by such school systems."

N. Grant Tubbs

Administrative Director of
Instructional Support Services
Virginia Department of Education

"Quality: Excellent, outstanding.

Teachers & Presentations: Excellent.

Technical: Superior, excellent.

Timeliness: the various topics were well chosen, and most appropriate, aimed at current problems."

Brother Barry Lambour
Principal

Peninsula Catholic High School

"The basic objective of [Project SETT-UP] is to demonstrate in the Peninsula area of Virginia that the intensive use of telecommunications can provide and deliver effective inservice special education teacher training programs from a central location.

"Data from the evaluation of the project have shown that it has far exceeded its goals. Many more teachers and administrators received training than originally was anticipated. Project SETT-UP has demonstrated unequivocally its usefulness in implementing Public Law 94-142, The Education for ALL Handicapped Children Act. One of the greatest benefits has been the close collaboration between the Federal, state, local and private sector which you have been able to pull together in this joint effort."

Herman Saettler

Chief Western Region and
Special Projects Branch
Division of Personnel Preparation
U.S. Bureau of Education for
the Handicapped

"CenTeX has essentially provided a customized service to the school division based on the specific needs of the staff in reaching educational goals.

Through the CenTeX system we can now deliver such training to three remote locations simultaneously, thus maximizing the availability of courses which meet teacher need and convenience. This is a cost-effective method of delivering high quality educational programming to our staff."

Donald S. Bruno

Superintendent
York County Public Schools

"After more than five years of direct experience with the CenTeX Special Education programs, we are more convinced than ever that the combination of the CenTeX needs assessment/curriculum development and innovative distribution strategies provides the only economically practical means by which states can effectively implement all aspects of the required comprehensive personnel preparation plan on a timely basis."

James T. Micklem, Director
Division of Special Education
Support Services
Virginia Department of Education

"In June of 1974, I enthusiastically endorsed the concept of interactive telecommunications advanced by you. I am equally enthusiastic today.

"The Williamsburg-James City County schools have been able to meet the requirements for inservice training of personnel in the area of special education through the programs of CenTeX. Teachers, administrators, and support personnel have been able to conveniently complete course work in their own buildings. The fact that the telecommunication system provides for interaction by the instructor and the student overcomes one of the most limiting factors of normal televised instruction."

Henry A. Renz

Superintendent
Williamsburg-James City County
Public Schools

"During the first complete year of operation, 1979-80, a total of 170 Hampton teachers took part in inservice training by means of the CenTeX 2500 megahertz telecommunications network courses..."

"More than ever, there is an urgency to develop vehicles that will deliver information techniques and strategies to meet new needs and, at the same time, provide for revitalization and updating of basic teaching/learning activities. The CenTeX...effort has certainly been very beneficial to that geographical area."

Carl L. Riehm
Assistant Superintendent
for Curriculum and Instruction
Virginia Department of Education

"The convenience of CenTeX, the quality of instructors, the privacy-protection factor, and the picture reception of cable television caused us to look with favor upon CenTeX, its planning, and its program. We expect the participants of the first year will generate enthusiastic interest among numerous other teachers, resulting in an even larger number of participants in 1980-81."

Oliver C. Greenwood
Superintendent
Newport News Public Schools

CenTeX[®]

CENTER FOR EXCELLENCE, INC.

"Small in size, our school division does not have the financial or human resources to provide a comprehensive inservice program in the many areas of need. CenTeX is an asset to our school division. Locally, we have a voice in identifying our staff development needs and in working closely with CenTeX officials in providing for those

needs. "Programs offered via two-way telecommunication certainly provides convenience to teachers, reduces gasoline consumption, and exposes teachers with concerns and ideas in our system to teachers with similar/different concerns and ideas of several other systems."

Raymond E. Vernall
Superintendent
Poquoson City Public Schools

Feedback from teachers enrolled has been highly favorable with about 90% indicating good to excellent results and acceptance."

Joseph H. Lyles
Assistant Superintendent
and Pupil Personnel
Services
Hampton City Schools

"The CenTeX system...is one of the most exciting and useful endeavors being applied to the field of education today. By expanding the delivery system to West Point, our school division has the capability to: 1) receive the inservice training programs made available by CenTeX, and 2) produce programs designed to meet locally determined needs (which can be transmitted to cooperating school divisions).

The telecommunication system will enable teachers, administrators and other instructional and supportive staff from several school divisions to participate in extensive inservice training programs offered on a live, interactive basis in locations and at times convenient to their participation."

George H. Stainback
Superintendent
King William —
West Point Public Schools

"With decreasing enrollments and need to reduce expenditures and possibly the number of open school buildings, it is most important that the costs of education be kept commensurate with the public's need for its services. One way to maintain the distribution, scope, and quality of public education is to make maximum use of two-way telecommunications delivery systems, such as those which CenTeX has in operation in Virginia's peninsula area."

Henry W. Tulloch
Member and former president
Virginia Board of Education

Board of Directors

The CenTeX Board of Directors, an interdisciplinary group, includes a representative from every major Virginia public and private entity concerned with the delivery of educational, medical and social services expertise and materials. The knowledge of its board members saves CenTeX thousands of hours and dollars in identifying, defining and establishing priorities.

Officers of the Board for 1980-81

Dr. Albert T. Harris — Chairman of the Board
John A. Curtis — President and Chief Operations Officer

Dr. James C. Windsor — Vice President and Chief Academic Officer

Stephen D. Harris — Secretary/Treasurer

Public School Education

Dr. Edward E. Brickell, Jr. (Superintendent of Schools, Virginia Beach)

Henry W. Tulloch (Member, Virginia State Board of Education)

Public Community College Education

Dr. Richard J. Ernst (President, Northern Virginia Community College)

Dr. Hyman H. Field (Director, Extended Learning Institute, Northern Virginia Community College)

State University Education

Dr. Albert T. Harris (Dean Emeritus, School of Education, Virginia State College)

Dr. James C. Phillips (Continuing Education Director, State Council of Higher Education)

Dr. James C. Windsor (Former President and Professor of Psychology, Christopher Newport College)

Dr. James M. Yankovich (Dean, School of Education, College of William and Mary)

Private Schools Colleges

Dr. Mary T. Christian (Chairperson, Department of Education, Hampton Institute)

Sister Lourdes Sheehan, R.S.M. (Superintendent of Schools, Diocese of Richmond/Virginia Private School Association)

Human Resources

Dr. Jean L. Harris (Secretary of Human Resources, Commonwealth of Virginia)

Medical Services

Dr. Edwin M. Brown (Deputy Director, Virginia State Department of Health)

Mental Health

Dr. Thomas F. Updike (Director, Community Mental Health Services, Virginia Department of Mental Health and Mental Retardation)

Vocational Rehabilitation

Altamont Dickerson, Jr. (Commissioner, State Department of Rehabilitative Services)

Visually Impaired

William T. Coppage, (Director Virginia Department for the Visually Handicapped)

Hearing Impaired

Fred P. Yates (Director, Virginia Council for the Deaf)

Corrections Department

The Reverend Grady W. Powell, Sr. (Member, Virginia State Board of Corrections)

Legal/Fiscal Affairs

Stephen D. Harris (Partner, McGuire, Woods & Battle; American and Virginia Bar Associations)

Computer/Science/Telecommunications

Dr. A. Wayne Bennett (Professor of Electrical Engineering and Chairman, Computer Engineering Group, Virginia Polytechnic Institute and State University)

John A. Curtis (Telecommunications Systems Pioneer; Founder, President, and Chief Operations Officer, Center for Excellence, Inc.)

As a life-long educator, I am well aware of the challenges facing our educational system, and of the concomitant problems militating against meeting these challenges through traditional educational delivery processes. It was the promise of new and more effective means of delivering educational, medical, and social services offered by CenTeX that precipitated my initial involvement on the CenTeX Board of Directors. The results demonstrated by the CenTeX approach continue to confirm the fact that the promise is real, and to convince me that the CenTeX system is the wave of the future.

The Commonwealth of Virginia is fortunate to have entirely within its borders the unique resource offered by the Center for Excellence and its CIT-PEDS system. I am proud to be the chairman of a board of prominent Virginians representing both the public and private sectors of the Commonwealth in the areas of educational, medical, and social services, all of whom are dedicated to serving the citizens of the Commonwealth more effectively through the delivery of vital human services via telecommunications.

Albert T. Harris
Chairman of the Board



Advisory Boards Provide Expertise

CenTeX has relied on advisory boards to help its programming and technology meet the precise needs of particular areas. Members of advisory boards can recommend uses for the telecommunications delivery systems, identify local resources, establish priorities, evaluate plans, assist in program implementation and bring credibility as well as knowledge and resource support.

When CenTeX determined that special education was the top-priority, unfilled educational need on the Peninsula, it established a regional advisory board, composed of representatives from all levels of public and private education in the area, to develop program ideas and priorities.

James T. Micklem, director of the Division of Special Education and Support Services in Virginia's Department of Education, has established the Special Education Statewide Advisory Board which identifies curricula and

teaching skills for CenTeX's special education programming, recommends priorities, and evaluates the effectiveness of the programming and telecommunications delivery system.

CenTeX also uses local school advisory boards to review curricula and operating plans, facilitate the delivery of information, select local program coordinators, critique program results and recommend improvements.

To help determine the usefulness of CenTeX's ideas on a national level, CenTeX has organized its National Curriculum Review and Faculty Selection Board. Members are top-flight experts in college-level special education teaching. They help CenTeX develop understanding of national needs and perspectives, provide productive, innovative thinking and help CenTeX identify and acquire personnel.

Federal, State, Local, and Private Funds

CenTeX's initial research efforts cost \$150,000. Founder John A. Curtis and two of his friends, James B. Ahlgren, an engineer, and John Scorce, a lawyer, and the engineering firm of Jules Cohen and Associates, supplied \$75,000. The administration and faculty of the College of William and Mary* supplied an equal amount in contributions of office and studio space and academic research.

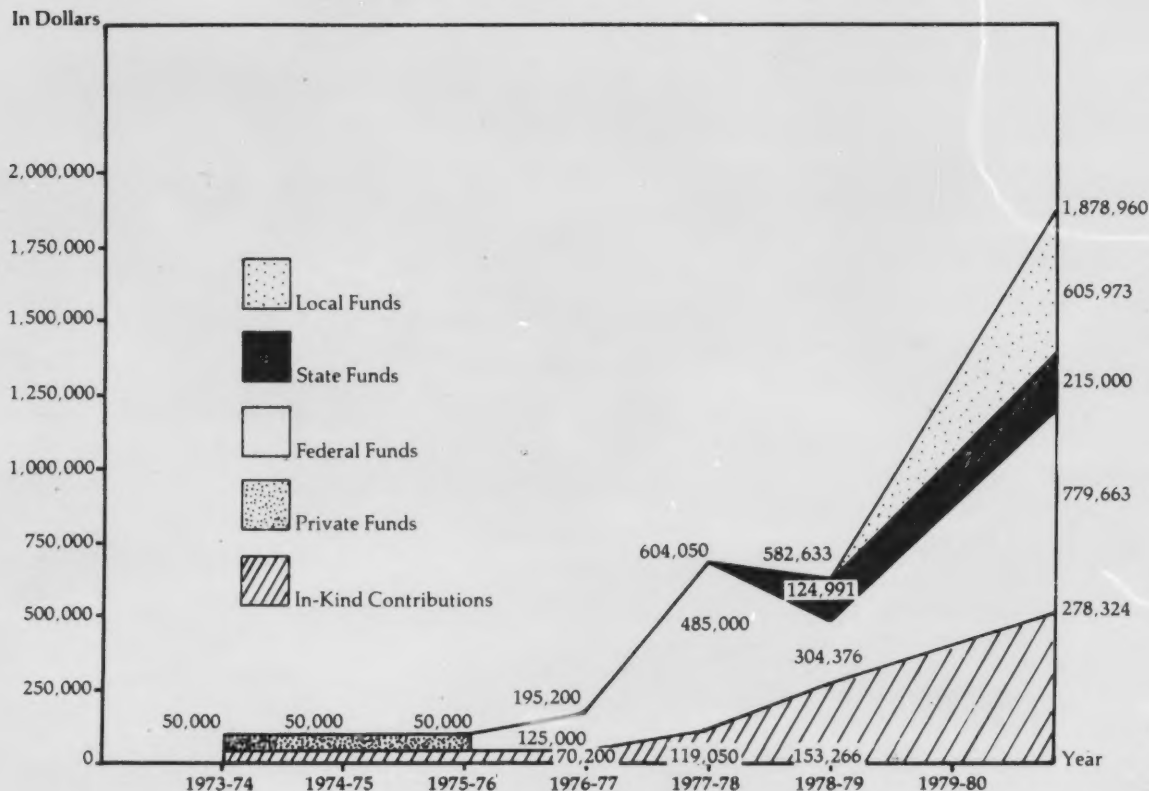
CenTeX put its ideas on the air with its first grant of \$125,000 from the federal Bureau of Education for the Handicapped. The success of this effort led to additional funding from the departments of Health, Education and Welfare and Commerce, funding that has totalled \$1.85 million since 1976. Most of this money has been spent on station construction and equipment.

Partially due to CenTeX testimony, Congress in

1979 decided that all non-profit educational telecommunications systems operators — not just public broadcasting stations — are eligible to receive funding from the federal Public Telecommunications Facilities Program. CenTeX received \$300,000 during the first year of this revised policy.

Since 1976, CenTeX has received \$2.98 million in federal, state and local grant money and \$758,615 in in-kind services to create its unique two-way interactive, multi-media, multi-service, privacy-protected, educational/medical/social services network.

Its telecommunications equipment is valued at \$1.5 million and its Tidewater Virginia system is expanding according to plan.



Since June 1, 1976: Total Dollar and In-Kind Funding: \$3,260,843

Total Federal Dollar Funding: 1,694,039 (52.0% of total)

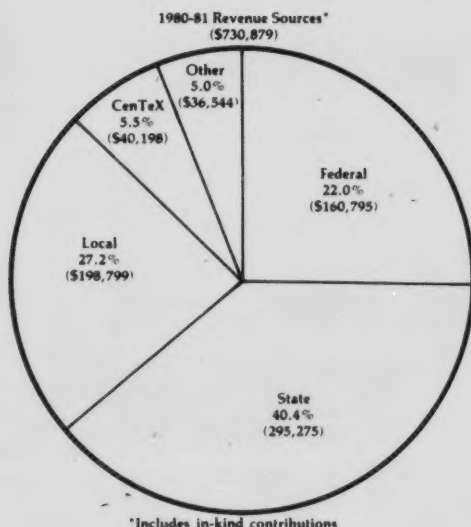
Total Local and State Dollar and In-Kind Funding: 1,566,804 (48.0% of total)

*President Thomas A. Graves Jr., Vice President for Academic Affairs George R. Healy, Dean Richard B. Brooks, doctors George W. Grayson, Louis P. Messier, Satoshi Ito, John S. Lavach, Ruth Mulliken, Robert Bloom, Douglas Prillaman, Robert Jones, and college employees James Slate, Clifford Pence and Stella Neiman and former Director of Development Warren Heemann.

Make CenTeX Economically Viable

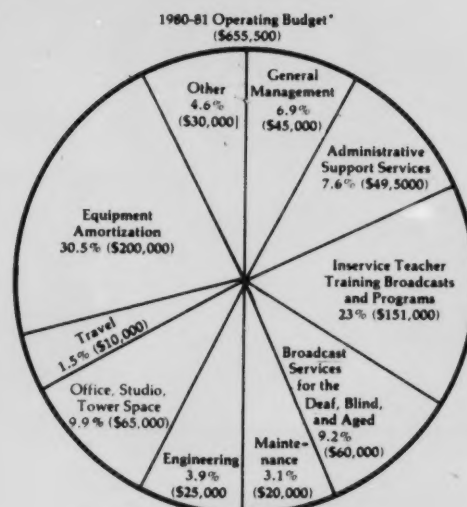
As soon as the Backbone stations are complete for CIT-PEDS, CenTeX will begin to become self-supporting. Its 1980-81 revenue sources total \$730,879 (excluding station construction and capital expenditures), of which only 22% comes from the federal government. The balance comes from state and local governments, CenTeX and in-kind contributions.

The biggest chunk of the budget, 37.5%, goes for equipment amortization, engineering and maintenance. Another 32.2% is spent on broadcast services and programming; and general management and administrative support services account for 14.5%.



CenTeX has tried to keep employees to a minimum. It operates with the equivalent of 21 full-time employees (three of whom are volunteers) who spend the majority of their time in programming, production and engineering.

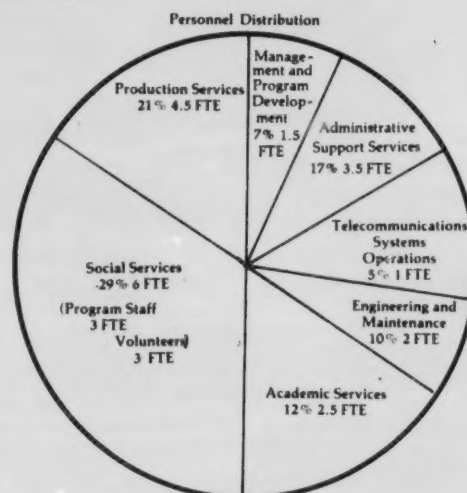
Once the CIT-PEDS Network is fully operational from King William to Virginia Beach, its costs will resemble those of other ITFS systems operating around the country. A survey of such systems (college, public and private school, medical and consortium) shows an average capital investment of \$1.18 million in the system and an average annual budget of \$369,138 (two-thirds personnel, one-third operations). These systems average 5.6 channels and 146 broadcast hours a week.



*Does not include equipment, station construction or other capital investments: these are usually separate projects.

The seven pioneer school divisions in the CIT-PEDS Network have shown their support for CenTeX and its ideas by signing 20-year contracts. Under these contracts, the schools supply CenTeX with land for its antenna systems, offices, utilities and custodial services, without charge, in return for the delivery of inservice teacher training and local use of the CenTeX stations.

The Commonwealth of Virginia currently pays school systems \$3 per pupil to provide inservice training for teachers. CenTeX's CIT-PEDS Network can deliver 12 one-credit inservice training courses to every teacher (approximately 24,500) in the 38 school systems in its service area, including urban, suburban and rural school systems, and amortize its equipment, all within the \$3 per pupil state standard.



COMMONWEALTH OF VIRGINIA



GENERAL ASSEMBLY

HOUSE JOINT RESOLUTION NO. 37

Congratulating the Center for Excellence, Inc.

WHEREAS, the Commonwealth of Virginia has long been committed to providing life-enhancing as well as life-sustaining services to the handicapped, the elderly, and the homebound and to furthering continuing professional education programs; and

WHEREAS, economic realities increase our recognition that these services can only be provided through the cooperative efforts of government agencies and concerned and compassionate private citizens; and

WHEREAS, the Center for Excellence, Inc., a private, nonprofit educational research organization, has for seven years been dedicated to disseminating vitally needed educational, medical, and social service information to the deaf, the blind, and the homebound, and to developing and distributing programs to improve the skills of educators and other professionals; and

WHEREAS, the Center for Excellence, Inc. established the first station in Virginia to provide two-way telecommunications to these populations; and

WHEREAS, John A. Curtis, the founder and current president, and the other members of the Board of Directors of the Center for Excellence, Inc. have selflessly contributed of their energies and expertise by taking time from their demanding professional lives to serve the Center for Excellence, Inc. without receiving any remuneration; and

WHEREAS, the Center for Excellence, Inc. has developed a two-way educational telecommunications network, which, when completed, will encompass an area between Norfolk and Richmond, thereby serving one-third of the people of the Commonwealth; and

WHEREAS, the Center for Excellence, Inc. has perfected many sophisticated telecommunications methods, including systems to allow broadcasts to be relayed to select audiences, ensuring the privacy of the viewer and the suitability of the transmission; and

WHEREAS, the Center for Excellence, Inc. has received the support and endorsement of the Virginia Commission for the Visually Handicapped, the Virginia Council for the Deaf, the Virginia Department of Health, the Virginia Department of Education, the Virginia Department of Rehabilitative Services, and the Virginia Department of Mental Health and Mental Retardation; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Center for Excellence, Inc. be congratulated on its many contributions in expanding the scope of information delivery services to isolated populations in Virginia; and, be it

RESOLVED FURTHER, That the Clerk of the House of Delegates prepare a copy of this resolution for presentation to the Center for Excellence, Inc. in token of the esteem in which it is held by the General Assembly and by fellow Virginians.

Agreed to by the House of Delegates,
February 27, 1980

J. H. Hallman Jr.
Clerk.

Agreed to by the Senate,
February 25, 1980

J. T. Shogshie
Clerk.

PART ONE

Section II - Did Project SETT-UP Meet the Pre-Project Objectives and Goals Established by Those Who Funded the Project's Implementation?

A. The Project SETT-UP problem-solving objectives, implementation goals and performance criteria (specifications)

Public Law 94-142, passed by the U.S. Congress in 1975, mandated that special children must be provided education of quality and diversity equal to that already being provided less special children by the nation's school systems. It also mandated that such education must take place in the least restrictive environments required to accomplish this national Special Education mandate. The Congress, further, put enforcement teeth and fiscal "carrots" into the context of 94-142 and appropriated hundred of millions of dollars to implement the magnificent public ideal underlying the law's purpose. Most American school systems, also fearful of parental legal attacks under the law, took immediate, substantial action towards implementation of the Congressional legislation, and many state legislatures passed new laws supportive of 94-142.

But the effective and timely implementation of 94-142 faced barriers requiring problem-solving concepts of sizeable magnitude. Most classroom teachers in 1975, for instance, had had little or no Special Education training, and even many of those assigned the responsibility for leadership in the area of Special Education had little or no professional training to support their assignments. Also, there were in America's teacher training schools too few qualified Special Education faculty members to supply the necessary inservice teacher training required to meet the time schedules mandated by the Congress for the full implementation of 94-142 objectives.

In Virginia's Peninsula area, for instance, CenTeX studies and those of the State Department of Education disclosed:

1. that more than 10.4% of all Peninsula-area public and private school children needed some type of Special Education services;
2. that 55% of these students were, during the period 1973-1975, not receiving the special education they so critically needed;
3. that most classroom teachers did not have training in the educational areas pertinent to the welfare of more than 10% of their students, thus precluding the effective implementation of the "least restrictive environment" (or so-called "mainstreaming") requirements of Public Law 94-142;
4. that one-third or more of those teachers and administrators responsible for school Special Education lacked college-level educational training in this highly specialized, critically sensitive educational area; and

5. that qualified instructional Special Education teacher-training expertise was so limited that:

- (a) only by multiplying the productivity of the limited supply of qualified Special Education college-level teaching expertise, and
- (b) only by delivering Special Education courseware to the locations where teachers work (the schools)

could Public Law 94-142 be implemented on law-prescribed schedules by economically practical programs.

But how could the needs and objectives obviously required by the factors set forth by 5. preceding be accomplished?

CentEX suggested that the intensive use of two-way modern telecommunications methodologies could accomplish on timely bases these needs and objectives in the Peninsula area of Virginia.

Convinced of the technical validity of the CentEX-proposed problem-solving methodologies, federal project director Dr. Herman L. Saettler and CentEX's founder, John A. Curtis, developed the subsequently stated performance specifications for Project Special Education by Telecommunications--Teacher Upgrade, which today is more readily recognized by its acronym SETT-UP.

B. Project SETT-UP performance specifications

The specifications initially established for Project SETT-UP performance and which have never changed since the project's first funding authorization are quoted below verbatim:

*"Special Education via Telecommunications:
Teacher Upgrade (SETT-UP)*

Project SETT-UP Three-Year Goals

Project SETT-UP has these specific three-year goals:

1. To demonstrate in the Peninsula area of Virginia that the intensive use of telecommunications technologies can provide and deliver effective inservice special education teacher training programs from a central location;

- (a) to remotely located classrooms;*
- (b) at times conducive to inservice teacher attendance;*
- (c) at per-inservice-teacher costs that are within the limits of current budgeting policies and current methodologies*

2. To provide--at the end of a three-year demonstration period--a comprehensive manual which:

- (a) will assess the degree to which the goals outlined by 1. preceding have been realized:
 - (b) will describe in detail the curricula, the operational needs, the technical specifications, the personnel expertise and training requirements, the inservice teacher effectiveness and gains in individual teacher understanding and performance;
 - (c) will be distributed to every State Superintendent of Public Instruction in America's 50 states, in such manner as to insure thorough consideration in its content and importance.
3. To make adaptive use of existing Special Education curricula and audiovisual materials in the implementation of project goals.
4. To implement an evaluation design and procedures that will provide for:
- (a) the collection of quantitative performance data; and
 - (b) the assessment of the effectiveness and efficiency of program resources in the attainment of program objectives."

C. Did Project SETT-UP meet the established specifications:

This report will now compare SETT-UP performance to the key specification wordage as these sequentially appear in the subject specification statement. For quick identification and correlation with the text of this report, the key-word content of the original SETT-UP specification has been underlined.

Specification 1

"To demonstrate that the intensive use ...can provide and deliver effective Special Education teacher training programs from a central location."

"provide...effective inservice Special Education teacher training programs"

Project SETT-UP and its self-generated continuing Special Education inservice teacher training projects RUS-1 and ITTS have to date produced more than 883 hours of inservice Special Education teacher training curricula. Four hundred and twenty-three--or approximately 50%--of these hours are college-credit, advanced-degree-eligible instruction.

Perhaps even more important than the quantity of CenTeX-produced Special Education curricula are the careful, coherent procedures which Project

SETT-UP has taken to assure the prioritized needs objectives and learning-effective productivity of CenTeX-produced curricula. These procedures include the use of CenTeX's grass-root-based needs and learning-tested curriculum development programs.

During the first year of Project SETT-UP, the project director and his associate evaluation and curriculum development team members devised, tested and, based on experience, finalized a curriculum-development procedure. This procedure is critically important to the net productivity of the CenTeX inservice teacher training programs. The key dictates of the procedure will, therefore, be outlined below.

In reviewing this procedure, you also will note that it begins with needs assessment studies but ends with marketing strategies, and that every step and factor developed by the procedures are carefully checked by local, regional, state and national qualified practitioners for accuracy and prioritization.

AN OUTLINE OF THE CENTEX CURRICULUM DEVELOPMENT PROCEDURE

1. Needs Assessment

Modern statistical methods are employed to determine precisely what teachers, practitioners, disciplinary experts and administrators need. The needs assessment procedure includes:

- (a) written assessment instruments and surveys
- (b) interviews with practitioners (individuals and small groups)
- (c) service/content-group discussions.
- (d) staff development personnel recommendations

The data for needs assessment activities are collated, analyzed and written in a report for further study and use.

2. Advisory Boards' Review

Three levels of Advisory Boards review the data generated by the needs assessment procedures.

These Boards, and their membership, are as follows:

(a) Local Advisory Board

Each participating school division organizes its own board/committee to assess and evaluate CenTeX's inservice programs in terms of the division's needs.

(b) Regional Inservice Curriculum Program Board

Membership: Directors of Instruction are representatives from each participating school division; CenTeX Director of Academic Programs; CenTeX Inservice Liaison Manager

The Chairman is selected annually by the board.

(c) Statewide Advisory Board

The Board members are determined and selected by the Virginia Department of Education. The members represent all levels of the educational process.

The local advisory board prioritizes the areas of need and develops working definitions and topic areas for curriculum development. The Regional Review Board reviews both the needs assessment data and the local advisory board documents to coordinate and recommend:

1. the courseware to be developed (typically 12 one-hour college courses per year or the equivalent thereof in 2- or 3-hour courses);
2. the selection of potential faculty;
3. the selection and inclusion of specialized teaching materials; and
4. the proposed broadcast schedule.

The statewide board reviews all the data generated by the curriculum development process to ensure that the courseware will meet statewide needs. This board makes recommendations in the areas of teaching expertise, course formats, course titles and content, as well as ideas for new areas of explorational development to make the curriculum program more widely applicable to state needs.

3. Course Development

CenTeX staff, in conjunction with the Directors of Instruction, develops the courseware which will be delivered via the CenTeX telecommunications system and selects the instructors. The instructors make a short video tape to both acquaint themselves with the instructional parameters of teaching via interactive telecommunications and to determine their own effectiveness. If the instructor is capable of teaching effectively via interactive telecommunications, the course is developed. The process involves the instructor, the CenTeX staff and the Directors of Instruction. Emphasis is placed on usefulness and applicability of the instruction, handouts and guides, as well as the use of supporting graphics and pertinent pre-recorded classroom examples.

4. Course Delivery

Once the courses are developed, they are distributed over the CenTeX telecommunications system. The distribution methodologies are:

1. two-way audio-video;
2. one-way, audio-video and audio-only-return;
3. conventional classroom; and
4. one-way audio-video.

The courses are delivered at times and locations convenient to the service population. At the same time, the courses are field-tested and evaluated for the first time.

5. Evaluation

CenTeX utilizes independent evaluation experts to develop and implement both formative and summative evaluation procedures. Formative evaluation is used by the course instructors throughout the class sessions. Summative evaluation is used for judging the overall teaching effectiveness and learning of the delivered courseware.

Formative evaluation is used to assess the cognitive learning and affective reactions of the participants during the weekly classes. Question-and-answer sessions over the interactive television, short paper-and-pencil exercises, observations and brief course evaluation questionnaires are used by instructors to provide information concerning the participants' learning and needs. This continuous data collection allows the class sessions to be altered at any point during the course in order to increase the achievement of specified objectives.

Summative evaluation enables the evaluators and CenTeX to judge the effectiveness of the courses. The primary purpose of this phase of the evaluation is to determine whether course objectives have been attained. Tests measuring the cognitive objectives for each specified course are constructed from the domain of test items submitted by each instructor. A pre-test/post-test design is used with these criterion-referenced instruments. The administration of the pre-tests at the beginning of the course provides a baseline for the participants' knowledge. The pre-test and post-test scores are statistically analyzed to determine whether significant gains in knowledge have occurred. In addition, reactions toward the two-way telecommunications format and toward instructor and content variables in the courses are assessed by an evaluation questionnaire completed at the conclusion of each course.

6. Field Testing

The courses are first field-tested via the telecommunications system. Then the videotapes of the courseware are further field-tested by other groups of teachers who do not have access to the telecommunications delivery system. Since these teachers view the videotapes without being able to interact with the instructor, the second field-test provides different types of data. The data from these two field tests and the evaluator reports based on same are the bases for revising the courseware and materials toward the goal of learning-efficient curricula.

7. Editing and Final Courseware Production

Using the data from the evaluators, the course participants, the Advisory Boards and the field-testing, CenTeX staff reviews each videotape and makes appropriate edits and additions to the program. Also, the handout materials, course objectives and suggested class-related activities for each videotape are codified and standardized for use with the videotapes. The instructors re-do sections as required, and, if needed, new graphics are inserted into the program to further enhance the quality of the program as well as to increase their effectiveness.

8. Delivery of Courseware

The curriculum package masters are duplicated and distributed by the Virginia State Department of Education throughout the Commonwealth so that those of the 61,000 Virginia teachers who could not get the curriculum programming can do so now.

9. National Marketing and New Program Development

Distribution of CenTeX two-way-taped curricula is not limited to Virginia. These curricula are packaged in groups targeted to specific learning areas and are nationally distributed.

The CenTeX national distribution procedure, designed to assure national usefulness and quality acceptance, is briefly outlined below.

(a) National Curriculum Advisory Board

The final curriculum packages are submitted to the CenTeX National Curriculum Advisory Board to:

1. seek evaluations regarding the national usefulness potential of the curriculum package, and
2. develop and recommend marketing methodologies that might be used to produce leasing/sales income from users located in geographic areas other than the Commonwealth of Virginia.

(b) Marketing Program

Based on the data from the National Curriculum Advisory Board, CenTeX develops and implements a national marketing program designed to disseminate its developed courseware packages. Some of the techniques include:

1. development and production of a curriculum sampler with appropriate written material;
2. presentations to pertinent national organizations/meetings; and
3. direct contact with pertinent state officials regarding the use of the material in their respective states.

10. Curricula Updating and New Program Development

To ensure new program development and future curriculum programming, CenTeX deposits the income generated by the curriculum packages in a separate, non-operative bank account. CenTeX spends the dollars derived from the lease or sale of its curriculum packages only for one or more of the following purposes:

- (a) defraying marketing costs;
- (b) revising curricula packages to keep their content up-to-date and effective;
- (c) acquiring equipment for use in the development and delivery of courseware; and
- (d) developing new courseware packages based on grass-roots, needs-assessment data, user-based field-tested evaluations, and cost-effective delivery-system distribution methodologies.

11. The Use of CenTeX's Instructor Training System

Telecommunications--especially two-way delivery systems--are new media to most instructors. To facilitate the orientation of instructors not familiar with telecommunications, and to permit the pretesting of instructors and materials for over-the-air transmission, CenTeX developed special training procedures and equipment, which are combined into a system called "Four-Eyes." This system's equipment components and capabilities enable the instructor to test material and delivery--with or without supervision--to test audience reaction and to assess likely over-the-air teaching effectiveness.

The "Four-Eyes" self-training system also enables instructors to learn quickly the basics of a new teaching methodology. After using the CenTeX self-training system only a few times, instructors soon learn that:

- (a) their curricula must be well-organized;
- (b) student groups want information--not "cute tricks"; and
- (c) they can, via two-way telecommunications, usually teach as much in 35 minutes as is normally taught in 45 minutes in a regular classroom, because they are "better organized and because all students can more clearly see the graphics and lecture-support materials."

12. The Use of University and College Academic Support and Degree-Credit Privileges

A working relationship with a college or university which has a good academic reputation in the field from which the desired instructional expertise can be obtained is a "must." These relationships not only make available faculty members, but also facilitate obtaining instructors

who might be needed from other colleges. Support by colleges and universities also substantially increases project credibility, as well as general acceptance by other pertinent academic entities.

Even more important are these facts:

1. Initially, the "carrot" which brought teachers to CenTeX classrooms was based on need for recertification credits and/or pure desire to know more about the relatively new field of Special Education.
2. As the SETT-UP program progressed, more and more of the potential CenTeX "market" wanted college-credit courses (toward advanced degrees) which could also be credited toward teacher recertification requirements. Most CenTeX courses, therefore, now are designed to qualify for college credit at William and Mary, Christopher Newport or other Peninsula-area colleges. (At this writing, approximately 25% of the CenTeX "student body" elects to meet the additional study-and-test procedures required by the advanced-degree academic procedures of the credit-awarding institution.)
3. It should also be noted, however, that many of the survey-determined curriculum needs are not taught by the Peninsula-located schools of education. In such instances, joint CenTeX-college curriculum development programs produce both the needed curriculum and the equally important credit-meriting privileges.
4. After experience dictated the establishment of the procedures outlined by E.1.2. and 3. immediately above, pre-test versus post-test evaluations of student cognitive gains showed substantial increases, going to 100% of those taking the pre- and post-tests instead of the 50% result produced by Project SETT-UP's first-semester operation.
5. Equally important is the fact that the use of the experienced-based CenTeX curriculum development and evaluation procedures (plus the use of the CenTeX telecommunications delivery systems) now enable CenTeX to do the following:
 - a. to effectively develop learning-tested and learning-efficient curriculum materials and tapes during an 18-month period; and
 - b. to develop a new type of curriculum tape which has been trademarked as "two-way" tapes because they include both the over-the-air multi-classroom questions and answers, as well as those developed by classroom use of the evaluation-revised tapes.
6. As will be subsequently discussed in detail by the cost-effectiveness section of this report, Dr. William C. Boshier, Director of the Virginia Department of Education's Inservice

Teacher Training Branch, states that his review of computer-recorded teacher requests for CenTeX's first-delivered two-way tape/material learning-targeted package will be viewed by 5,000 of Virginia's 61,000 school teachers.

7. Regarding the requirement for "effective" curriculum, the following page (23), from a CenTeX brochure, contains important facts.

So that the evaluators of this report have a full understanding of the type and quality of the curriculum produced by Project SETT-UP, these items follow Page 23:

- (a) a copy of the teacher curriculum bulletin issued for SETT-UP's first semester of over-air distribution of Special Education curriculum;
- (b) a copy of the latest such bulletin issued (for this Fall's curriculum program); and
- (c) a complete copy of the evaluation report covering the first three semesters of Project SETT-UP two-way curriculum delivery system.

Specification 1(a): "to remotely located classrooms"

All Project SETT-UP instruction originated from a single location. Currently this curriculum is received at 118 school locations via the CenTeX two-way, multi-media telecommunications delivery system which 1. permits the remotely located student bodies, as well as the studio-located student body, to ask questions and to receive answers provided by the instructor and/or students, and 2. enables all students--no matter where located--to hear all questions and all answers given thereto, whether they come from a student or an instructor

Specification 1(b): "at times conducive to inservice teacher attendance"

Initially, Project SETT-UP delivered to its Special Education inservice teacher training curricula during time periods immediately preceding and/or immediately following the daytime school student instruction period.

Experience and teacher surveys, however, have clearly determined that adherence to the following teacher preferences make inservice teacher training programs conducive to teacher attendance:

The following, for instance, are findings from the June 1979 Project SETT-UP teacher/administrator Special Education inservice teacher training needs-assessment study:

a. Sampling Dimension

A total of 462 respondents returned the questionnaire

CentEX has a three-phase test and evaluation procedure for its projects. Members of its evaluation team participate from 'day one,' even during the project planning stages. They work alongside the project director and sum up results at the end of the project.

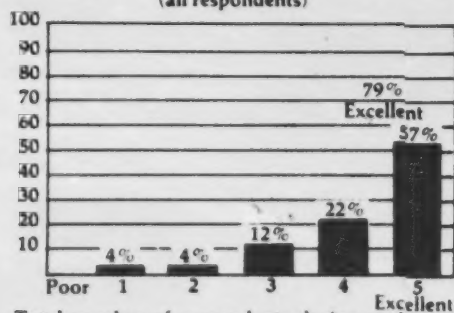
The evaluation survey methods and project check-points are critiqued by nationally respected, outside experts and members of the pertinent CentEX advisory boards both before implementation and after the final project results have been analyzed.

The following look at Project SETT-UP (Special Education via Telecommunications: Teacher Upgrade) is typical of CentEX evaluation efforts.

Project SETT-UP began broadcasting six one-hour courses in special education in Spring 1978. The courses offered credit toward renewal of teaching certificates and later one college-credit course was added each semester.

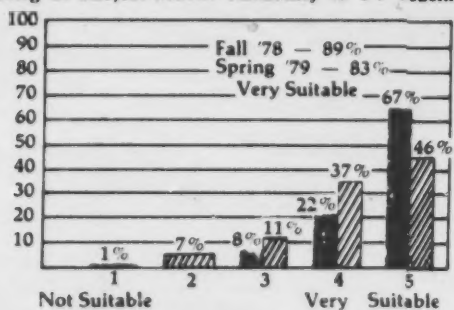
For the first three semesters the courses were available to 10 schools in the Williamsburg area (Williamsburg-James City County, Magruder Elementary in York County, Walsingham Academy, Jamestown Academy and the Eastern State Hospital school). Of the 338 teachers, 71.9% took one or more courses during the three semesters. Total course enrollment was 387.

Rating of Overall Quality of Inservice Courses
(all respondents)



Total number of respondents during project: 255

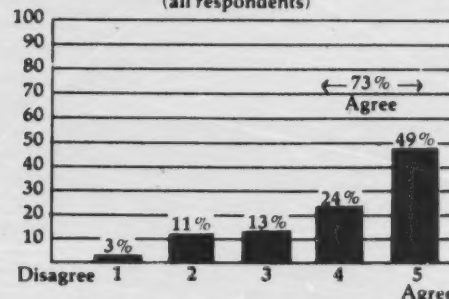
Rating of Subject Matter Suitability to TV Teaching



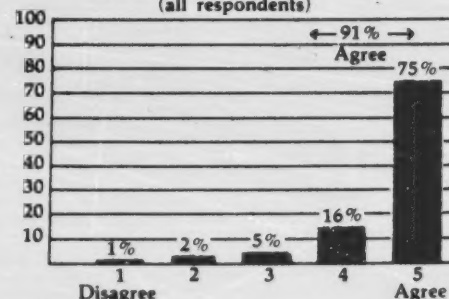
Number of respondents: Fall 1978 83 Spring 1979 46

NOTE: Percentages do not add up to 100% due to rounding.

Belief That It Is Easy to Interact with the Instructor
(all respondents)



Belief That Television Holds Real Promise As Training Device
(all respondents)



Total Number of respondents during project: 255

NOTE: Percentage does not add up to 100% due to rounding.

During late 1979, the lower Peninsula (Newport News, Hampton, Poquoson, lower York County and Peninsula Catholic High School) was added to the service area, giving a potential of 4,489 teacher participants. Evaluation studies for the entire Peninsula are currently being established.

Quizzes and questionnaires enabled the instructors to evaluate and, if necessary adapt, the courses while still underway.

The evaluators looked at format, content and effectiveness, all with an eye toward improving the project.

Eight courses during the first three semesters were evaluated by using tests before and after the courses to measure increase in knowledge. In six of the courses (75%) students showed a significant gain.

Evaluation also showed that two-way audio-video delivery systems were more effective than one-way systems. Of the students served by two-way circuits, 78.1% received A's and B's compared to only 60% of those served by one-way circuits. There were no drop-outs among the 'two-way' student bodies, but the 'one-way' student body had a drop-out rate of 23.1%.

Students were also asked to assess their satisfaction with the course content and the telecommunications delivery system. The answers were overwhelmingly positive.

Executive Summary

Program Evaluation: Project SETT-UP

(Spring, 1978 - Spring, 1979)

Roger R. Ries
George M. Bass, Jr.

Evaluation Plan: Overview

Nineteen inservice teacher education courses were telecast during the academic year (Spring, 1978 through Spring, 1979). These courses were selected on the basis of needs assessments surveys administered periodically to local educational personnel. Respondents were asked to identify special education problems that create the most difficulty in their work and to select possible inservice educational topics they felt would help them overcome these difficulties. Instructional objectives and curricula were developed for the targeted populations based upon analyses of these needs surveys.

Two types of evaluation were utilized during the implementation of the inservice programs. Formative evaluation was used by the course instructors throughout the class sessions. Summative evaluation on the overall effects of the course was carried out by the internal evaluators of Project SETT-UP.

Formative Evaluation

Formative evaluation was used to assess the cognitive learning and, affective reactions of the participants during the weekly classes. Question and answer sessions over the interactive television, short paper and pencil exercises, observations, and brief course evaluation questionnaires were used by instructors to provide information concerning the participants' learning and needs. This continuous data collection allowed the class sessions to be altered at any point during the course in order to increase the achievement of specified objectives.

Summative Evaluation

Summative evaluation enabled the Project SETT-UP evaluators to judge the effectiveness of the courses. The primary purpose of this phase of the evaluation was to determine whether course objectives had been attained. Tests measuring the cognitive objectives for each specified course were constructed from the domain of test items submitted by each instructor. A pretest/posttest design was used with these criterion-referenced instruments. The administration of the pretests at the beginning of the course provided a baseline for the participants' knowledge. The pretest and posttest scores were statistically analyzed to determine whether significant gains in knowledge had occurred. In addition, reactions toward the two-way telecommunications format and toward instructor and content variables in the courses were assessed in all courses by an evaluation questionnaire completed at the conclusion of each course.

Analysis of Cognitive Knowledge Gain

During Project SETT-UP, the knowledge gain in certain courses was assessed through pre- and posttests over course content. (Courses in which the objectives were oriented to the development of technical skills were not evaluated with such written tests.) The primary purpose of using such a design was to determine whether the objectives for the course were achieved. Tests measuring the cognitive objectives for each specific course were constructed from the domain of test items submitted by each instructor. All students receiving the continuing education were asked to complete the same test at the beginning and again at the end of the course. Students' scores were analyzed using a t-test for correlated means. (The exact values are reported in the evaluation report for each semester's classes.)

As can be seen in Table 1, there have been eight courses which used a pretest/posttest design to measure cognitive gain. (During Spring, 1979, three additional courses were supposed to use a pretest/posttest design, but no statistically valid results could be obtained due to the size of each student sample.) Of these eight courses, six have shown statistically significant ($p < .05$) changes in test performance. It appears that students increased their knowledge by the end of the course in 75% of the courses evaluated.

Table 1
Cognitive Gains in SETT-UP Courses

Semester	Number of Courses Taught	Number of Courses Using Pre-test/Posttest Design	Number of Courses Showing Significant Gain ($p < .05$)	% of Pretest/Posttest Courses Showing Significant Gain
Spring 78	6	4	2	50%
Fall 78	7	3*	3	100%
Spring 79	6	1*	1	100%
TOTAL	19	8	6	75%

*Three other courses originally planned on using a pretest/posttest design to assess cognitive gain; however, their low enrollments did not justify a statistical analysis of their test results.

Analysis of Course Evaluation Questionnaire

The Course Evaluation Questionnaire was administered in order to assess the reactions of the participants to the training modules and two-way interactive television. The following sections of this report presents the analysis of those questions assessing the participants' satisfaction with and perception of two-way telecommunications as an inservice educational delivery system. Additional questions concerning instructor effectiveness and course relevancy have been analyzed and presented in semester reports.

Each question asked the participant to respond using a five-point scale. Although the verbal labels on the scale differed among the questions, a numerical rating of "5" was the most positive and "1" was the most negative response with "3" being the neutral rating. The following figures display the total percentage of respondents for all Project SETT-UP inservice education courses choosing a given numerical rating for each question. Additional figures present this same data broken down by semester in order to allow a comparison among the various semesters. Frequently, percentages may not add up to one hundred due to rounding errors and non-responses by participants to particular questions.

Rate the overall quality of this course. (Figures 1a and 1b)

As can be seen in Figure 1a, there were very high student ratings on this question. Seventy-nine percent of all respondents chose the highest or second highest rating for this item. Only 8% selected a negative rating. Twelve percent chose the neutral rating. When this data is analyzed by semester, there is some variability among the respondents (Figure 1b). Courses telecast during the fall semester (1978) received the highest positive rating. The overwhelming majority of respondents (92%) chose one of the two highest ratings, with 75% choosing the highest rating. An extremely small percentage (2%) of this group of respondents selected one of the negative ratings. Undoubtedly, teachers perceive the overall quality of Project SETT-UP quite positively.

How suitable to TV teaching was the course subject matter? (Figure 2)

As with the previous item, the overall response to this question was quite positive (Figure 2). During the fall semester, 89% of the students chose the highest or second highest response. Only 1% of these students chose a negative rating. Although the responses to the spring semester (1979) courses were more varied, they also were quite positive. Eighty-three percent chose one of the two highest ratings. These ratings compare favorably with the ratings of courses offered during the 1978 spring semester. Students were asked to respond to this question using a two-point rating scale. Eighty-eight percent of this group of respondents saw no difficulty in teaching the subject matter through two-way telecommunications. The courses offered through Project SETT-UP have varied in objectives, content, and instructor style. Clearly, teachers feel that most inservice special education topics are suitable for two-way interactive television.

The television format is awkward and hard to get used to. (Figure 3a and 3b)

Students have not perceived the two-way interactive television format as awkward and hard to get used to. Seventy-five percent of the respondents gave this a "4" or "5" rating, thus disagreeing with the statement (see Figure 3a). Five percent agreed with the item, choosing a rating of "1" or "2." Fifteen percent chose a neutral rating of "3." There was little variability among the courses or by semester (see Figure 3b). Apparently, teachers do not perceive the two-way television format as difficult to adapt to, regardless of course content or objectives.

It's really quite easy to interact with, or ask questions of, the instructor. (Figure 4a and 4b)

Students' ratings of this question are displayed in Figures 4a and b. The majority of students indicated that it was quite easy to interact with the

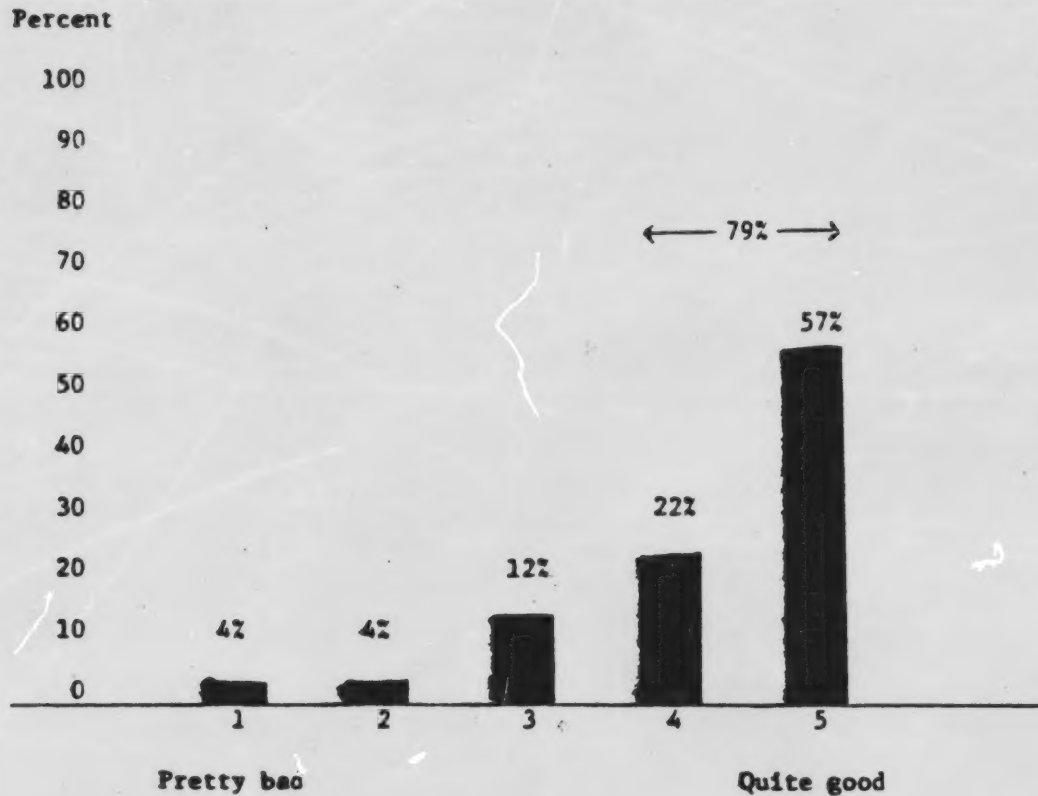
instructor. Seventy-three percent of the respondents chose one of the highest two ratings. Fourteen percent chose one of the negative ratings, thus indicating that they felt it was difficult to ask questions or interact with the instructor. Thirteen percent of the respondents chose the neutral rating of "3." Although there is some variability when this data is analyzed by semester, it does not appear significant.

I believe the television format holds real promise as a training.
(Figure 5a and 5b)

This item consistently has received the highest rating among the questions assessing student perceptions toward two-way interactive telecommunications. As can be seen in Figure 5a, an overwhelming majority of respondents have given this item a positive rating. (91%). Only 3% of the total number of respondents chose a negative rating. There is little variability among the three semesters. Undoubtedly, teachers feel strongly that the two-way interactive television format holds real promise as an inservice educational delivery system.

Figure 1a

Rating of Overall Quality of Inservice Courses
(all respondents)

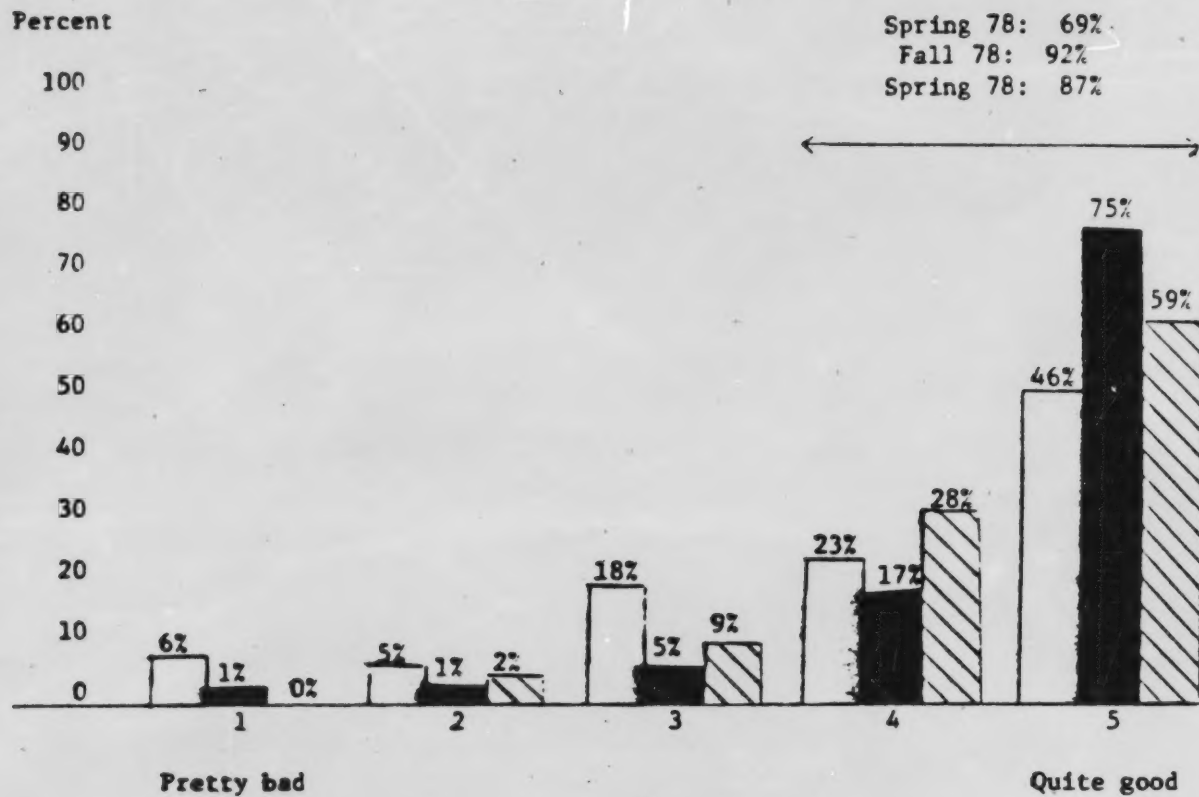


Total number of respondents during project: 255

NOTE: Percentage does not add up to 100% due to rounding errors.

Figure 1b

Rating of Overall Quality of Inservice Courses
(by semester)



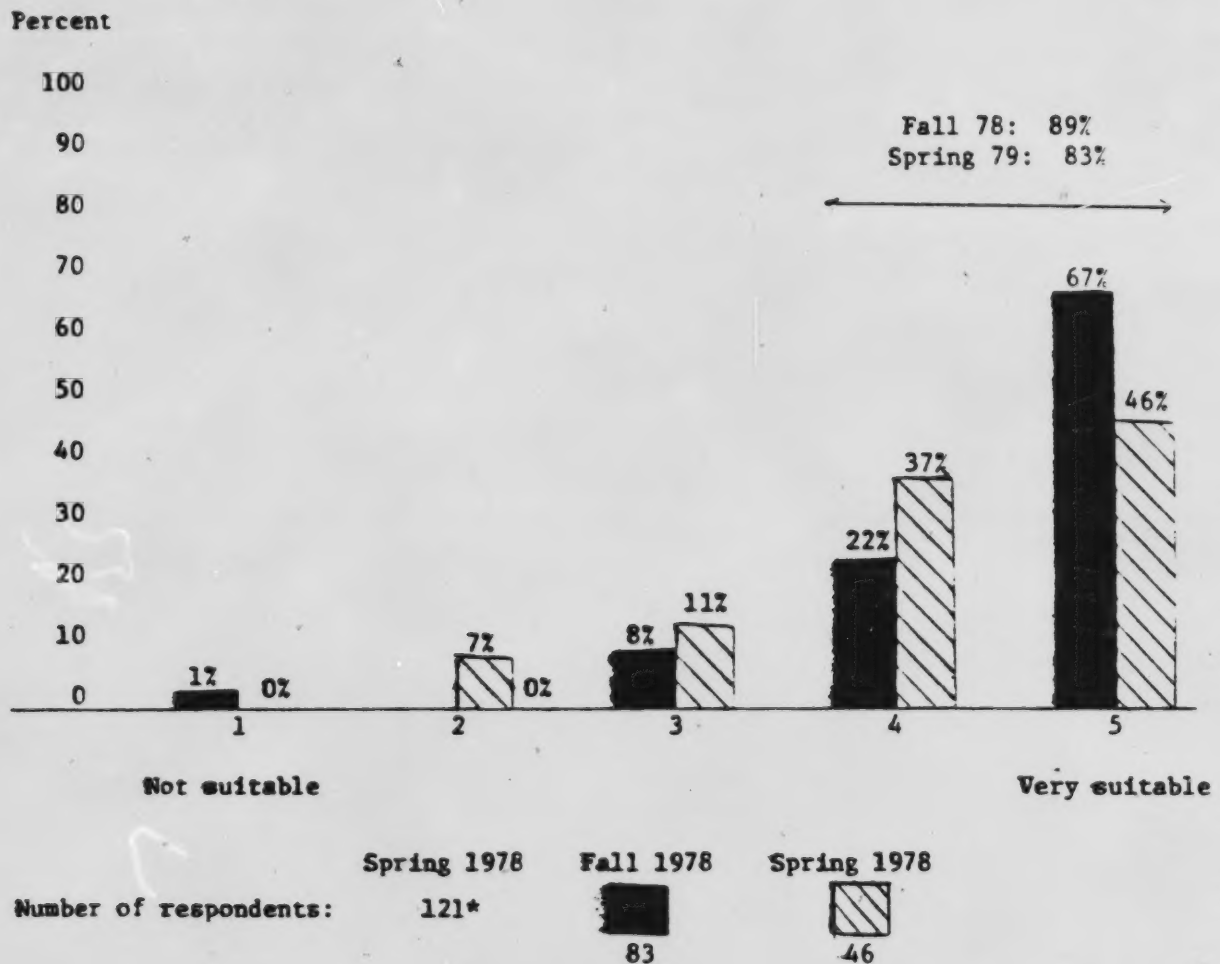
Number of respondents:

Spring 1978	Fall 1978	Spring 1979
		
126	83	46

NOTE: Percentages do not add up to 100% due to rounding errors.

Figure 2

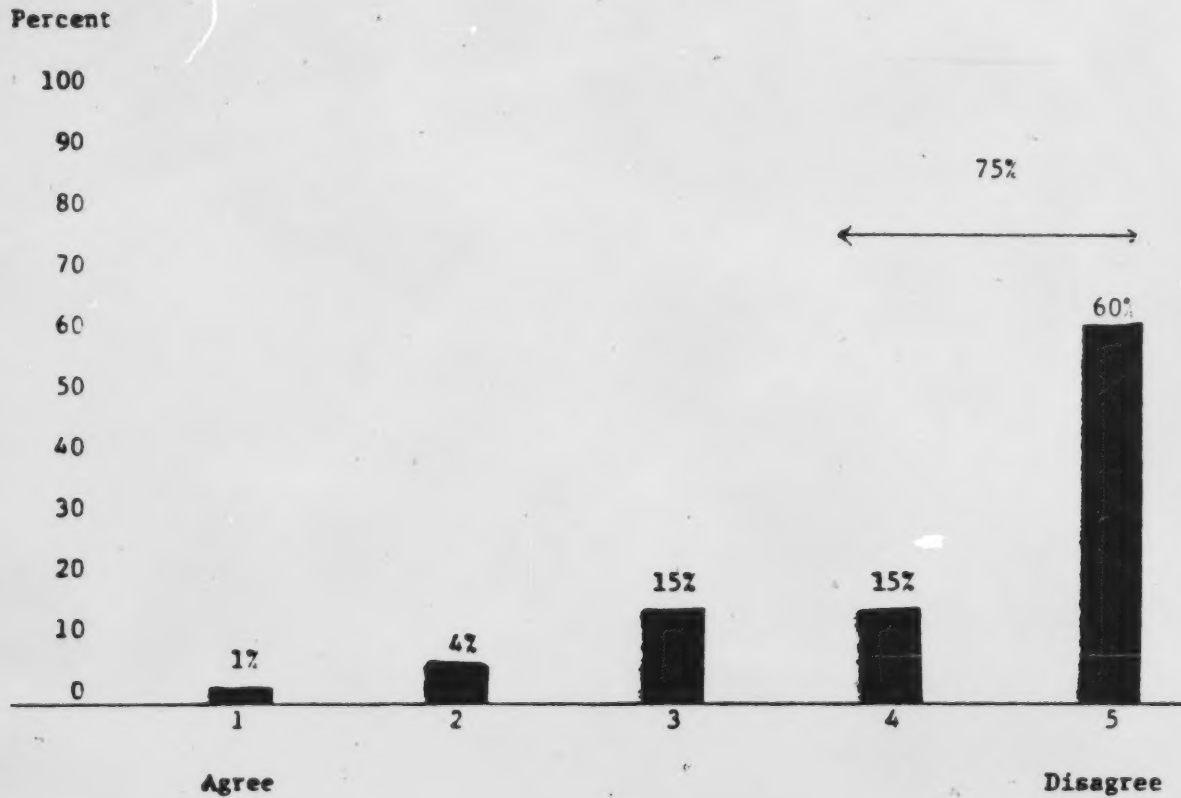
Rating of Subject Matter Suitability to TV Teaching



*Only asked as "yes/no" question with 88% indicating, "yes, it was suitable."

Figure 3a

Belief that Television Format is Awkward and Hard to Get Used to
(all respondents)

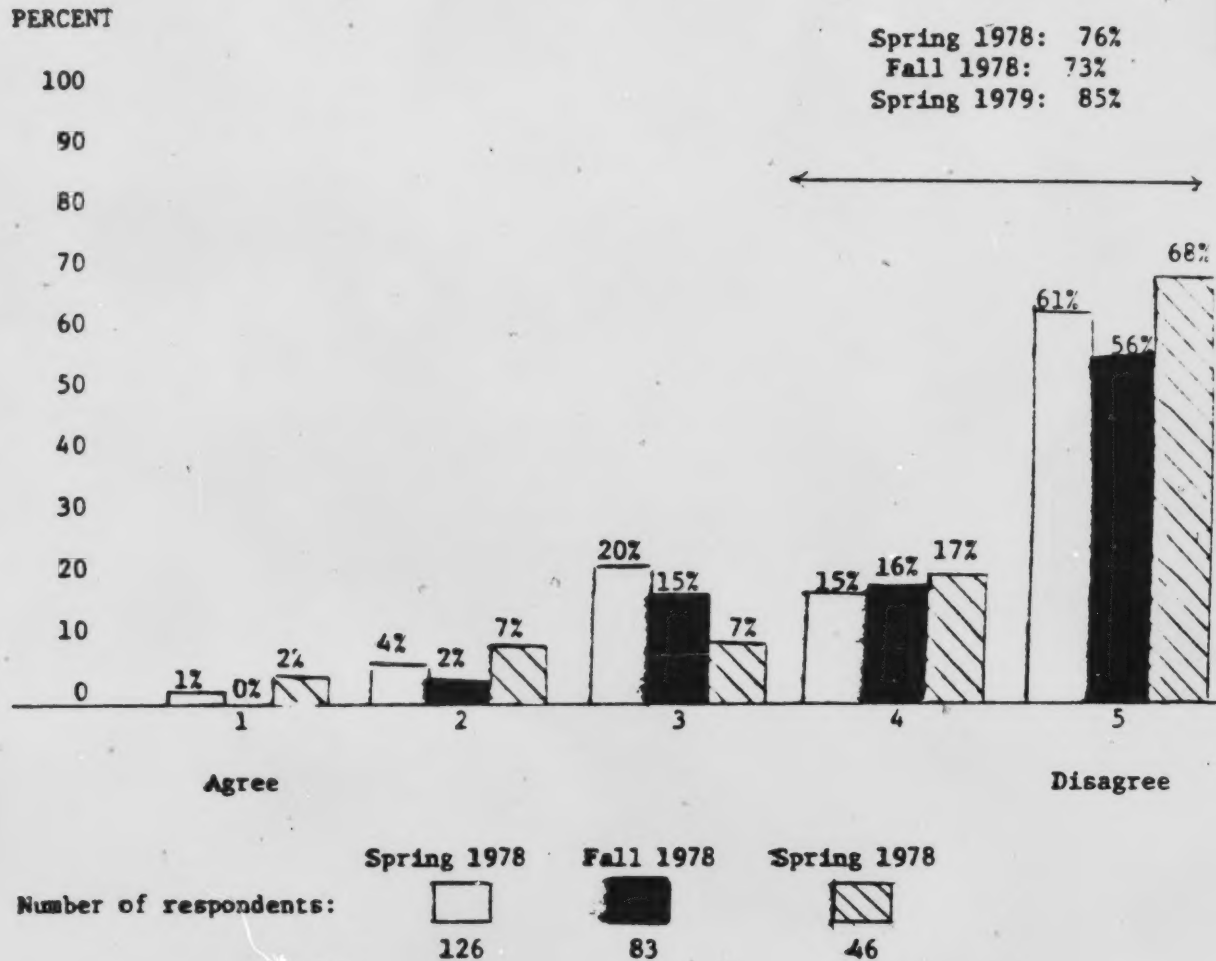


Total number of respondents during project: 255

NOTE: Percentage does not add up to 100% due to rounding errors.

Figure 3b

Belief that Television Format is Awkward and Hard to Get Used to
(by semester).



NOTE: Percentages do not add up to 100% due to rounding errors.

Figure 4a

Belief That It Is Easy to Interact with the Instructor
(all respondents)

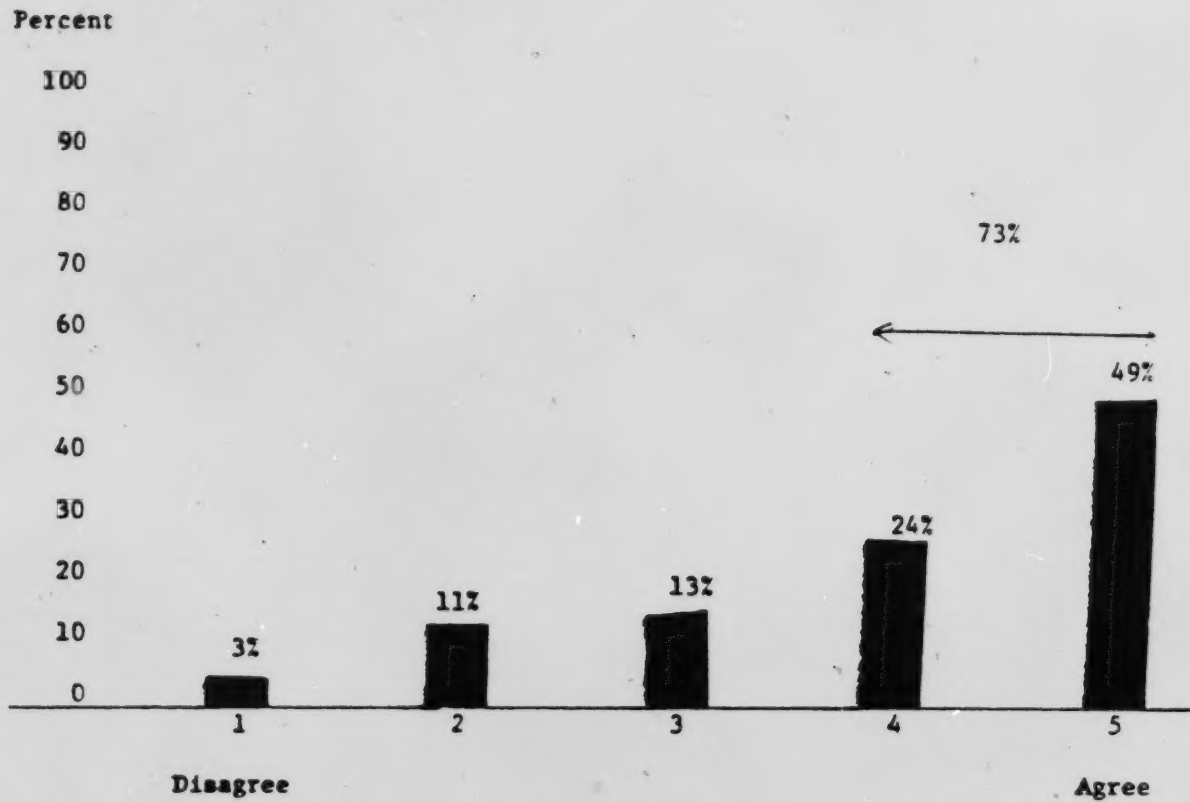
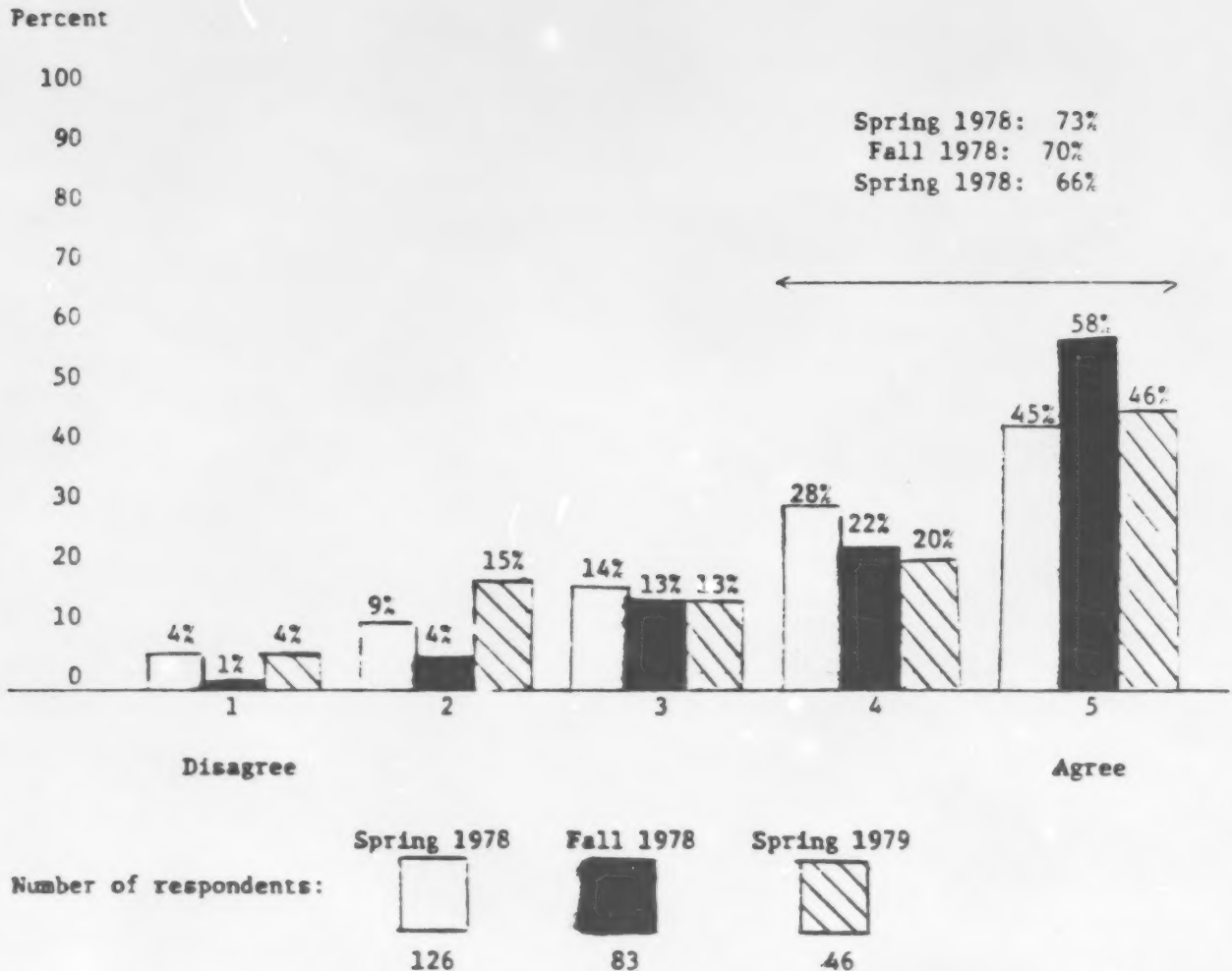


Figure 4b

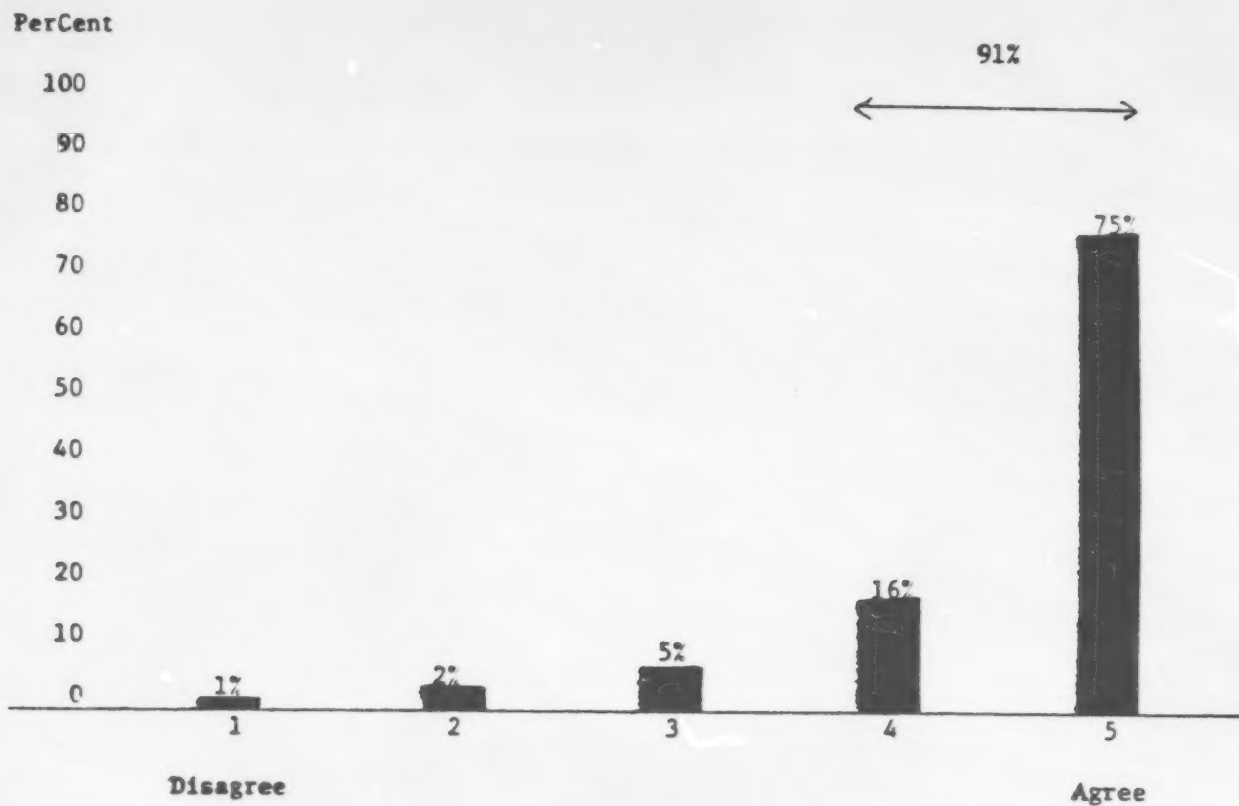
Belief That It Is Easy to Interact with the Instructor
(by semester)



NOTE: Percentages do not add to to 100% due to rounding errors.

Figure 5a

Belief That Television Holds Real Promise As Training Device
(all respondents)

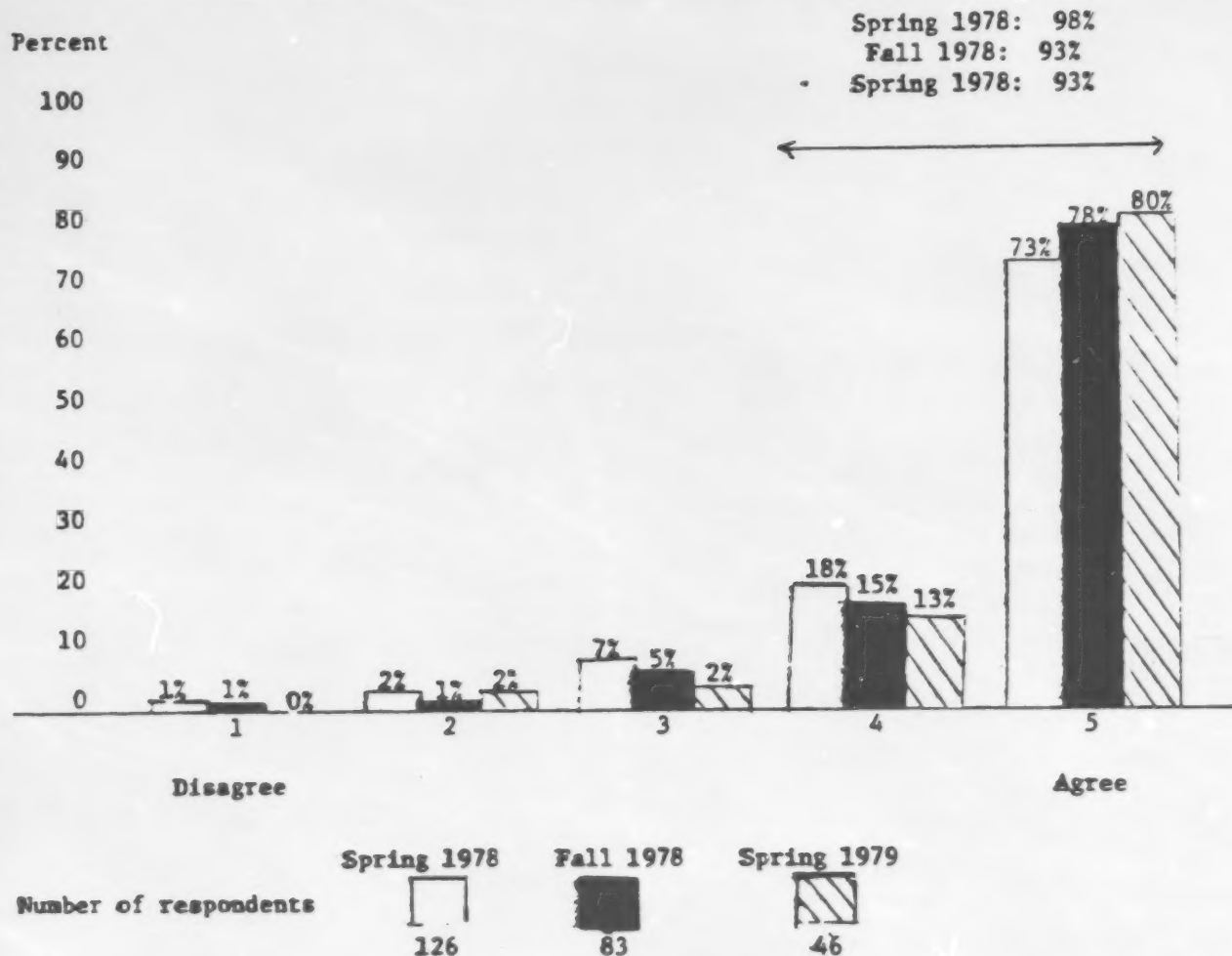


Total number of respondents during project: 255

NOTE: Percentage does not add up to 100% due to rounding errors.

Figure 5b

Belief That Television Holds Real Promise As Training Device



NOTE: Percentages do not add up to 100% due to rounding errors.

(419--90% of whom indicated they were classroom teachers), and the grade-level distribution was nearly equal between elementary and secondary.

b. Specific Questioning Results

- (1) The time of year preferred for inservice teacher training was the Fall term, as indicated by 52% of the respondents. This was the most frequent choice in all four school systems. "Doesn't matter" was chosen by 30%.
- (2) Concerning the best time of day for scheduling inservice teacher training, in all four school systems the clear preference was immediately after the school day ends, with 62% preference. "Just before school day begins" and "weekday evenings" were chosen much less frequently, 17% and 16%, respectively.
- (3) The optimal length for class meetings was 60 minutes, with 39% responding to this option. The second choice was for "120-minute classes," although only 20% chose this length.

Specification 1(c): "at per-inservice-teacher costs within the limits of current budgeting policies and current methodologies"

As will be subsequently noted under Section III, following (Distribution System Design and Actual Service Performance), the CenTeX delivery-system is a comprehensive and an economically practical and viable one. As evidence of this fact, it should at this time be reemphasized that the annual operating costs of:

- a. the CenTeX Special Education Curricula Development Program; and
- b. the operating costs of the CenTeX (1) local, (2) regional, (3) state and embryonic national Special Education Distribution Systems are being paid by a combination of local school and state funding at this time.

CenTeX has met and exceeded the specification to which this paragraph refers.

For instance, (1) CenTeX has not only delivered during the period of the project Special Education inservice teacher training to Peninsula-area school locations (as required by SETT-UP project), but continues so to do without federal support; (2) by implementing innovative concepts not required by SETT-UP specifications but made possible as a by-product of the SETT-UP grant award, CenTeX's Special Education curricula are today being viewed (according to Virginia State Department of Education estimates) by a teacher population totalling more than 6,000 teachers, or approximately 10% of Virginia's total population.

Details supporting the preceding are detailed by Section III of this report.

Specification (2)

Regarding goal 2 of the original Project SETT-UP specification ("to provide every State Superintendent of Public Instruction a comprehensive manual which assures the degree to which the goals (Project SETT-UP goals) have been realized") and describe in detail "the operational needs, the technical specifications, the personnel expertise and training requirements, the inservice teacher effectiveness and the gains in individual teacher understanding and performance," the following facts are pertinent:

1. During the second and third Project SETT-UP years, CenTeX requests for funding and BEH's Personnel Division's actual grant values were as follows:

	<u>Project SETT-UP CenTeX Funding Requests for</u>	<u>BEH Project SETT-UP Grants for</u>	<u>Dollar Difference Between Funding Requests and Grant Values</u>
SECOND YEAR	\$ 564,737	\$ 300,000	- \$ 264,737
THIRD YEAR	<u>349,169</u>	<u>245,000</u>	- <u>104,169</u>
TOTALS	\$ 913,906	\$ 545,000	- \$ 368,906

The reductions in federal funding of CenTeX's grant requests obviously drastically reduced CenTeX's ability to meet "head-on" this specification.

2. The dollars required to collect and organize into readily usable format the necessary information and operating data, much less to publish the complete "replication manual" set forth as an objective by the original Project SETT-UP specifications, were not made available to the Project.

CenTeX and Project SETT-UP's Federal Project Officer, therefore, developed and implemented alternative plans to at least meet the goals of Specification B.

(a) BEH's Own Effective Project SETT-UP Dissemination Efforts

Three examples of the many BEH efforts immediately follow this page.

(b) CenTeX's Project SETT-UP Dissemination Efforts

One innovative CenTeX effort was the publication by the American Society for Engineering Education of a monograph describing the telecommunications methodologies available for use by educators.¹⁰

¹⁰ © 1979 The American Society for Engineering Education Library of Congress Catalog Card Number 79-53685. Copies available from American Society for Engineering Education, One Dupont Circle, Suite 400, Washington, D.C. 20036. Single copy cost \$7.50 each.

This monograph, titled Educational Telecommunications Delivery Systems, was co-edited by Project SETT-UP's director and Dr. Joseph W. Biedenbach (director of South Carolina's Continuing Education Programs).

The four reprints following this page are chapters from this book.

The SETT-UP pertinent points about this publication are these:

- (a) Each chapter regarding one of the six available telecommunications delivery system methodologies was written by a nationally recognized expert who wrote from years of experience-based knowledge.
- (b) Project SETT-UP experience, as well as a matrix of national experience and user costs regarding the use of the four telecommunications methodologies which SETT-UP initially utilized, are carefully identified by and documented by Educational Telecommunications Delivery Systems.
- (c) Because the American Society for Engineering Education is this nation's foremost professional society in its field (approximately 15,000 members), the book had from its inception a high level of creditability which even its nationally known authors could not have alone provided the publication.
- (d) ASEE's distribution system and its annual and regional society meetings reach those most likely to provide in the field the know-how required to initiate and guide replication of the CenTeX delivery system, and ASEE has and continues to promote the sales of Educational Telecommunications Delivery Systems of these meetings.
- (e) Indicative of the reader-interest of the publication is the fact that it is the first ASEE "monograph" to require "a second printing" even though the number of copies authorized for first-run printing equalled or exceeded the number of first-run copies authorized for any similar ASEE monograph.
- (f) A copy of Educational Telecommunications Delivery Systems was sent to every State Superintendent of Education in the 50 states, as well as to many others who have inquired about Project SETT-UP's innovative methodologies.

As the Appendix volume to this report indicates, however, the preceding is but one of the many, many examples of local, regional, state and national efforts utilized to accomplish at least some of the manual objectives which the elimination of Project SETT-UP dollar requests for manual production for a time seemed unobtainable.

Selected for presentation at the 1978 Eastern Regional Meeting of the Division of Personnel Preparation, Bureau of Education for the Handicapped, USOE, DHEW

PROJECT SETT-UP

SPECIAL EDUCATION VIA TELECOMMUNICATIONS / TEACHER UPGRADE

John A. Curtis - Center for Excellence, Inc. - P.O. Box 158
Williamsburg, Virginia 23185 - 804/229-8541

The Center for Excellence, Inc. (CenTex[®]) is a non-profit corporation with research and resource development capacities. One of its primary purposes has been the establishment of a national telecommunications laboratory designed to determine the applications and costs of telecommunications systems for the delivery of expertise and materials in education, medicine, and the social services.

Currently, the laboratory is devoting its efforts to the development and operation of a two-way telecommunications system for the delivery of professional preservice and inservice training, and for diagnostic-prescriptive special education and medical services. The targets for this two-way training and service delivery are recipients in the urban, suburban, and sparsely populated regions of Virginia's tidewater area.

Started with private funding, CenTex began its basic research in telecommunications systems in 1973. In 1976, the results of its research led to support from Virginia's General Assembly and to financial assistance from the Division of Personnel Preparation/Bureau of Education for the Handicapped. Soon thereafter, funds were also awarded by the Virginia State Department of Education's Division of Special Education.

The State of Virginia has established a statewide advisory committee to review and make recommendations regarding curricula for CenTex's Project SETT-UP, which was initiated with BEH funds and is CenTex's first major federally funded project. While providing training and other special education and medical communications, the project seeks to test the applicability of telecommunications delivery systems and to evaluate their costs. The project is unique and experimental, as well as demonstrable, in that it uses three of the six available educational telecommunications methodologies to determine the applicability of each.

TELECOMMUNICATIONS DEVELOPMENT AND OPERATION

The six different telecommunications systems currently in use by educators in the United States are:

- * Public broadcasting systems
- * ITFS systems (Instructional Television Fixed Service)
- * CATV distribution systems
- * FM stations

Project SETT-UP

- * Telephone-line teleconferencing circuits
- * Satellite networking circuits

The CenTex Project SETT-UP system utilizes ITFS circuits as its basic telecommunications methodology. However, its ITFS system includes the use of CATV and telephone-line conferencing circuits when either of these circuitries is useful, when the need for non-video return circuits is evident, or when cost considerations justify the use of these systems.

The Federal Communications Commission established Instructional Television Fixed Service in 1971, at which time 28 television channels were set aside for the exclusive distribution of non-profit educational instruction materials. This closed, two-way transmission system permits face-to-face contact and discussion between two or more remotely located classrooms and a central instructor located within a radius of twenty miles from a fixed transmitter-receiver location. The versatility of the system can be used not only to provide video-audio television interaction, computer-center access and material retrieval, and hard copy (facsimile) transmission, but its circuits are believed to be protected by the privacy provisions of the 1934 Communications Act.

A fixed CenTex transmitter-receiver station has five telecommunications components: the television studio, the main transmitter, two-way studio transmitter link, two-way transmitter-receiver sites, and a mobile transmitter-receiver station. Technical characteristics of the system developed by CenTex include networking circuits to connect two or more fixed stations and/or instruction centers so that instructors located at any fixed station location can deliver locally or throughout the network area of a hundred miles or more. As previously noted, the system also provides for privacy and is easily used by non-technical personnel. Since equipment in the system is of solid-state design, the system is reliable and relatively trouble-free.

Depending on the service distributed, the initial fiscal investment of fixed ITFS stations and associated studios ranges from \$200,000 to \$300,000. Estimated annual operating costs per station range from \$100,000 to \$125,000 when six or more fixed stations are networked together.

The CenTex system is currently delivering programs to ten school locations and will shortly add four more sites where groups of teachers receive special education inservice instruction. Beginning in May 1979, supplemental distribution is expected to triple the number of school locations served.

THE INSTRUCTIONAL PROGRAM

Other first-year activities of the project included staff training, curriculum development, and the pilot-testing of programs. Needs assessment data suggested the types of courses and specific topics of interest to local teachers. Six courses were developed on this basis:

- * Introduction to Special Education

Project SETT-UP

- * Assessment Methods and Procedures
- * Learning Disabilities
- * Legal Aspects of Education
- * Language and Signing
- * Teaching Disturbed Children

The curriculum for each course was presented to local, regional, and state review boards prior to broadcasting, and each was approved for one hour of non-college credit toward certification renewal. Teachers received course outlines, course evaluation forms, reference notes, and contact notes to facilitate interaction during the course. Broadcasts were delivered from 8:00 to 8:45 a.m. and from 3:30 to 5:00 p.m. because teachers indicated that these were the most convenient times for them.

EVALUATION

The project's built-in evaluation procedures make it practical to assess the effectiveness and efficiency of all phases of the program. In addition to needs assessment data and the review by the advisory board, formative evaluation methodologies have been implemented since the inception of the project. Instructors are asked to identify and define course outcomes, and participant reactions are periodically surveyed to obtain feedback on the effectiveness and relevance of course activities. This continuous data collection allows instructional procedures to be altered at any point to increase the probability of achieving objectives.

Six pilot instructors were trained for roles as television teachers. Their performances were broadcast to pilot classrooms in the service area and were videotaped along with participant reactions. These tapes were reviewed and analyzed prior to any subsequent broadcasts.

Internal evaluators are also used to assess participant-teacher response to any effects that telecommunications mechanical devices might have on the training environment and, thus far, only 5 percent of the participants have experienced any interference. More than 90 percent of the teachers in the program appear to prefer the two-way telecommunications delivery methodology to the more customary but less convenient on-campus type of instruction.

The collection of quantitative performance data is a second evaluation phase. Tests have been constructed to measure the objectives of each course. Pre and post test results indicate that significant increases in knowledge have occurred in four of the six courses delivered to date. A lack of consistency reported in gain scores for the remaining two courses may be the result of low content validity of the test items for these courses. Test instrumentation procedures are, therefore, being reviewed, and any necessary revisions will be made.

Project SETT-UP

Overall, the first-year (and, to date, second-year) evaluation data show that training via two-way telecommunications delivery systems is both effective and economically viable. One unobtrusive measure of success has been the fact that 54 percent of the potentially available teachers have enrolled for one or more of the CenTex courses during the two semesters of the system's operation.

THE FUTURE

During the third year, Project SETT-UP expects to demonstrate its training delivery potential to more than 1800 teachers in a geographic area of 550 square miles. A comparative analysis will also be made of the amount of knowledge and skill gained through each of the telecommunications approaches used in the project, and these results will be compared to gains accomplished in a conventional classroom training environment by the same instructor. The impact of the mobile van component will also be assessed for its effectiveness as a diagnostic service delivery mode for local physicians and patients. Finally, cost-effectiveness data will be obtained and compared with costs of other existing delivery methodologies.

Replication of the system is, of course, a major concern to CenTex, as well as to the Bureau of Education for the Handicapped. At the conclusion of the project, therefore, a manual will be prepared by the project's staff. This manual will include procedures, methods, strategies, and costs associated with the establishment of a telecommunications system for the delivery of special education inservice teacher training. This document will be distributed for review by state officials, special educators, and support service personnel in each of the 50 states. Additional replication information, as well as operations information, will be provided through local, state, and national publications.

DELIVERY OF INSTRUCTIONAL PROGRAMS VIA TELECOMMUNICATIONS: BASIC PRODUCTION CONSIDERATIONS

By Alan R. Blatecky

For the purpose of this article, I am assuming that you already have, or have access to, the information, materials, expertise, curriculum, and teaching talent required for delivery of instruction. While the programming may not be in the format required for delivery over a telecommunications network or a satellite interconnection, the process of adapting the program is easily accomplished once the level of production and quality is chosen.

What will be discussed, then, are the various levels of program production, with special consideration for quality, impact, flexibility and, most important, the costs involved. The four levels of production range from single-camera one-person operations to multi-camera, editing, and post-production facilities. This article will also review the current status and immediate future capabilities of storage devices, from videotapes to videodiscs.

Production Facilities

The production levels described and discussed are not descriptive of every studio production facility. In many instances, depending on the production needs and the program requirements, a facility may upgrade both equipment and personnel in certain areas, and will have some of the capabilities of the next level. Also, in most instances the production facility does not exist by itself, but exists in connection with some other facility such as an audiovisual department at a university, the studio at a broadcast station, or a media center in a college.

Each level, however, is separated by discrete increments of quality and production capability. To move from one level to another is not accomplished simply by adding more equipment or personnel. To move up a level means the purchase of new equipment to replace existing equipment and acquiring or retraining the personnel to handle the new level of production capability and equipment operation.

Ever wanted to find out about the costs involved in producing a videotape ... or the facilities, equipment and personnel needed to broadcast a live instructional program to remote sites ... or the technology that would permit you immediate access to 50,000 pictures — each of which you could call up immediately for classroom use? If so, this is the article for you. It's probably the simplest, most practical, and most complete explanation of what video technology is all about that you'll see anywhere.

Level I is the type of facility that small local school divisions might operate, or the type a small private college would use as part of its audiovisual department. Level II can be found at small colleges and universities where there is some interest in communications, or in a public school district that already has the facility available for vocational training purposes and for a broadcast journalism class at the high school level. Level III production facilities are often operated by the larger universities or colleges which offer a communications course of study, or by a large public school system that produces some of its own curriculum for distribution via a telecommunications delivery system and which uses the system as an integral part of its instructional process. Level III is also often operated by a medical school, a community college with a strong communications curriculum, and some consortia which broadcast their own programs.

Level IV facilities are found at commercial and public broadcasting stations, as well as at major production centers. Large universities that offer degrees in Broadcasting will often have Level IV capability. Statewide educational networks and other broadcasting facilities also operate Level IV facilities.

Parameters of production quality. Before discussing the various levels of production facilities, a short explanation regarding levels of quality is necessary.

In almost every case, differences between production facilities result from two factors: the video cameras and the video recorders. These two items determine the final technical quality of the product and program involved, and often dictate what the rest of the production facility will have.

The picture quality of the system can be only as good as the camera that produces it and the recorder that stores it. If one of these items is far better than the other, there will be little increase in overall quality. For the most cost-effective result, the sophistication of the two items should match.

The limiting factors in the quality of the pictures are resolution (how sharp and detailed are edges, patterns, and small objects?), picture stability (does the picture move or does it appear stationary; does it stay within FCC specifications regarding picture stability?), color fidelity, and the signal-to-noise ratio (how much signal is there in comparison to the noise?).

These four factors are the primary elements in picture quality, and both the camera and the recorder determine these factors. Fortunately, an increase in one factor is often accompanied by an increase in the others. Unfortunately, overall increases are achieved at costs that are geometric, rather than arithmetic. In terms of videotape records, for

example, to increase from 1/2" videocassette recorder quality to a 3/4" broadcast videocassette recorder quality, the cost increases from \$1,600 to \$9,000; to increase to 1" broadcast recorder quality will drive the cost up to \$90,000. Similar costs also occur at the camera end of the system.

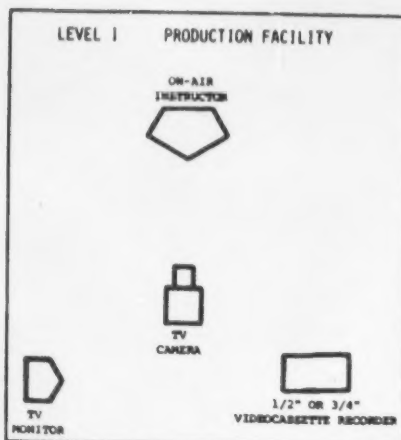
However, advances in equipment are occurring each year, and the result is that higher levels of picture quality are costing less. The new 1/2" videocassette recorders, costing about \$1,600, now perform as well as did the 3/4" U-matic videocassette recorder of four years ago, which cost around \$5,000. Even more dramatic improvements are taking place in video camera technology and digital processing equipment.

Differences in picture quality between the various levels are noticeable to the trained eye and to anyone who can see the two pictures side by side for comparison. However, if information transfer is the primary objective, then high resolution and high signal-to-noise ratios and their higher costs may be of questionable value. Such factors as future use, production variety, program requirements, and cost become the determinants of the level of production chosen.

The other major difference among production levels concerns the amount of production flexibility and sophistication available. For example, if a proposed production requires that an event or activity need only be recorded, little extra equipment will be required. If remote, on-location recording is necessary and an edited final version is desired, then a higher level of production must be sought. The level of sophistication may vary from production facility to production facility but, as is true of picture quality, usually the higher levels of sophistication and production capability go hand in hand with the higher technical quality of the equipment. The two-way gain — greater sophistication and higher picture quality — often go together in discrete, measurable quantities that correspond to one of the four levels described.

Level I Production

The first level of program production is that of a single-camera, one-person operation. Production capabilities are suited primarily for a lecture style program or activity in which the camera is simply used to record the program for later distribution and use. Typical uses include taping lectures, student teachers, or specific classroom activities, and extending the classroom for overflow situations and/or teaching to remote locations. (See the Level I Production Facility Chart.)



The equipment component consists of a camera (black and white or color), a videocassette recorder, and the required cabling and necessary equipment. The picture quality is similar to that received on a television set in the home. Typical production costs (not counting studio or classroom space) are as follows:

Equipment Component	Black and White	Color
1. Camera	\$ 1,500	\$4,000
2. Videocassette Recorder	\$ 1,500	\$1,500
3. Accessories	\$ 1,500	\$2,000
4. Supplies	\$ 750	\$1,000
Sub-Total	\$ 5,250	\$8,500
Personnel Component		
A/V Technician	\$12,000	\$12,000

The per-hour tape production cost, based on 1,000 hours of use per year, is \$13.75 for the black-and-white capability and \$14.85 for the color capability. A 2-hour finished program, including the cost of the videotape, would cost approximately \$280 to produce, or about \$130 per program hour. If the production facility is used simply to record lectures as they are being delivered or to extend the instruction throughout the immediate area via closed circuit television or a telecommunications network, and no production is necessary other than that required to tape the lecture, the per-program cost would be approximately \$15 plus \$30 for the videotape, or \$45 per hour.

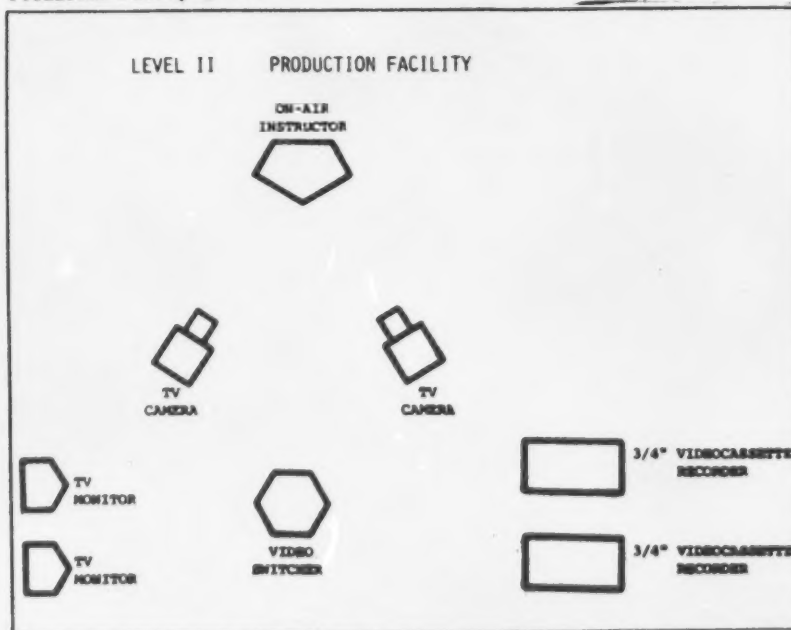
The annual operating budget of a Level I production facility, including personnel and equipment amortization and main-

tenance is \$22,500. If production and programs are to be kept for an extended period, additional videotape stock would have to be purchased at a cost of about \$30 per hour of tape.

Level I production does not work well if graphics and drawings are required, nor does it allow for any editing or redos. However, if the intent is to record or extend a current program or activity on a limited scale, or to augment existing courseware by assisting in the classroom, Level I production will suffice.

Level II Production

Level II is a two-camera, 1-1/2 person operation with moderate editing capability. The production capacity allows the program developer or the instructor the opportunity to do some simple editing, to add graphics, and to produce a fairly sophisticated videotape. Typical uses include producing segments of a course that will be delivered later on tape (e.g., a general orientation or introductory course requiring the same basic information for all participants); specific subject-area treatments so that the entire class would not have to be transported to a remote site but, rather, the site could be brought to the classroom (e.g., a look at a nuclear plant or utility); and remote teaching via a telecommunications network so that students in other areas could receive all of the instructional process. (See the Level II Production Facility Chart.)



Necessary equipment at Level II consists of two cameras, limited editing equipment, and the equivalent of a 1-1/2 person staff. Typical production costs (not including studio or classroom space) are:

Equipment Component	Cost
1. 2 Color Cameras	\$ 9,000
2. 2 Videocassette Recorders	\$ 9,000
3. Editor	\$ 6,000
4. Monitors	\$ 1,800
5. Switches	\$ 4,000
6. Accessory Video Equipment	\$ 4,500
7. Audio Equipment	\$ 2,500
8. Portable Recorder	\$ 4,500
9. Misc. Cabling	\$ 2,500
10. Misc. Equipment, Racks	\$ 4,000
11. Supplies	\$ 3,000
Sub-Total	\$50,900

Personnel Component

1. Technician (Full-time)	\$13,000
2. Camera Operators	\$ 6,000
Sub-Total	\$19,000

Other

1. Maintenance Contracts	\$ 2,000
2. Repairs, Replacement Parts	\$ 2,000
Sub-Total	\$ 4,000

The per-hour tape production cost, based on 1,000 hours usage annually, is \$40. A two-hour finished program involving a total of 15 hours of production would cost approximately \$750 to produce, or \$375 per program hour.

The per-hour cost of producing a live program (broadcasting an instructor's course so other students at remote sites could participate in it) is approximately \$40 per hour plus \$30 for a videotape (assuming it is to be recorded), for a total cost of \$70 per hour. While the Level II facility can be used to broadcast a live program, the instability of the

Level III Production

Level III production has basically the same capability as Level II but has extended editing capabilities, can handle electronic captioning and character generation, and has the capabilities of multi-level production techniques. The system has more equipment than does Level II and has "broadcast" capability, which simply means that it can meet broadcast standards in terms of stability and, thus, can readily be sent over a telecommunications network or satellite interconnection. Level III also involves more full-time personnel, as well as occasional or hourly people. (See the Level III Production Facility Chart.) The systems parts and their costs and their costs are as follows:

Equipment Component	Cost
1. 3 Color Cameras	\$ 38,000
2. 3 Videocassette Recorders	\$ 30,000
3. Editor	\$ 15,000
4. Video Switcher	\$ 12,000
5. Time Base Corrector	\$ 12,000
6. Character Generator	\$ 4,000
7. Monitors	\$ 8,000
8. Distribution Amplifier	\$ 3,000
9. Accessory Video Equipment	\$ 9,000
10. Sync Generator	\$ 2,500
11. Audio Equipment	\$ 5,000
12. Remote Taping Equipment	\$ 7,000
13. Cabling, Connectors	\$ 5,000
14. Misc. Equipment, Racks, etc.	\$ 7,000
15. Studio Supplies	\$ 6,000
Sub-Total	\$163,500

Personnel Component

1. Studio Manager (Full-time)	\$ 18,000
2. Technician (Full-time)	\$ 15,000
3. Camera Operators	\$ 12,000
Sub-Total	\$ 45,000

Other

1. Maintenance Contracts	\$ 4,000
2. Replacement Parts	\$ 5,000
3. Minimum Videotape Stock	\$ 3,000
Sub-Total	\$ 12,000

The per-hour production cost, based on 1,000 hours' annual usage, is \$94. A typical two-hour finished program involving 20 hours of production and the additional videotape would cost approximately \$2,000 or \$1,015 per program hour. The per-hour cost of producing a live program for broadcast, including 1/2 hour set-up and 1/2 hour take-down time, plus the cost of the videotape to record the broadcast, would be \$218 per broadcast hour.

videocassette machines limits the extent to which they can be used as a broadcast source. On some closed circuit systems, this does not present problems. For standard broadcast television, however, additional equipment is required to play recorded tapes.

The annual operating budget of a Level II production facility, including personnel and equipment maintenance and amortization is as follows:

Equipment Amortization	\$15,600
Maintenance	\$ 2,000
Personnel	\$18,000
Supplies	\$ 4,000
Other	\$ 5,000
Sub-Total	\$44,600
25% Overhead	\$11,150
TOTAL	\$55,750

Level III production quality is such that programs can be produced for major redistribution. The production capability allows the instructor and/or program developer to rework the material extensively for later broadcast and distribution. The instructor can use the character generator for titling and captioning those aspects of the program which require emphasis. Level III also has a time base corrector, known as a TBC, which makes it possible for any tape to be played back over a telecommunications broadcast system. Also, because of the quality of the tape recorders, several copies and generations can be made without seriously impairing the quality of the final product. This latter aspect is very important when many different sources of program material are used and a completed product of high quality is required.

The annual operating budget for a Level III production facility is:

Equipment Amortization (4 yr)	\$ 40,875
Maintenance	\$ 6,000
Personnel	\$ 45,000
Supplies	\$ 8,000
Other	\$ 10,000
Sub-Total	\$109,875
25% Overhead	\$ 27,469
TOTAL	\$137,344

Level IV Production

Level IV is a basic broadcast-quality production facility. Many production facilities are more complete and larger than this example, but the difference is more a matter of degree and amount of equipment than of quality. The major difference between Level IV and Level III is in the quality of the equipment and in the staffing. The capabilities are quite similar, except that there is more flexibility in Level IV production. For example, Level IV has the capacity for more effects (Chroma-Key and slow motion, to name only two). The primary difference between these two levels is the broadcast quality production available at Level IV. This means the use of 1" video recorders instead of 3/4" videocassette recorders, and accompanying upgrades of hardware and software throughout. (See the Level IV Production Facility Chart.)

Level IV production quality is especially good when major redistribution of the program is the primary consideration. If the use of public or commercial television stations is envisioned, or if the use of a major telecommunications network or satellite circuit is the primary distribution methodology, Level IV production is the

preferred level. Moreover, if a program has already proven its value, a new "packaged," well produced version may be worth Level IV production. Also, since either 1" videotape or 2" Quad is a broadcast standard used by every television broadcast station in the country, the product can be used by any station. The costs for Level IV are:

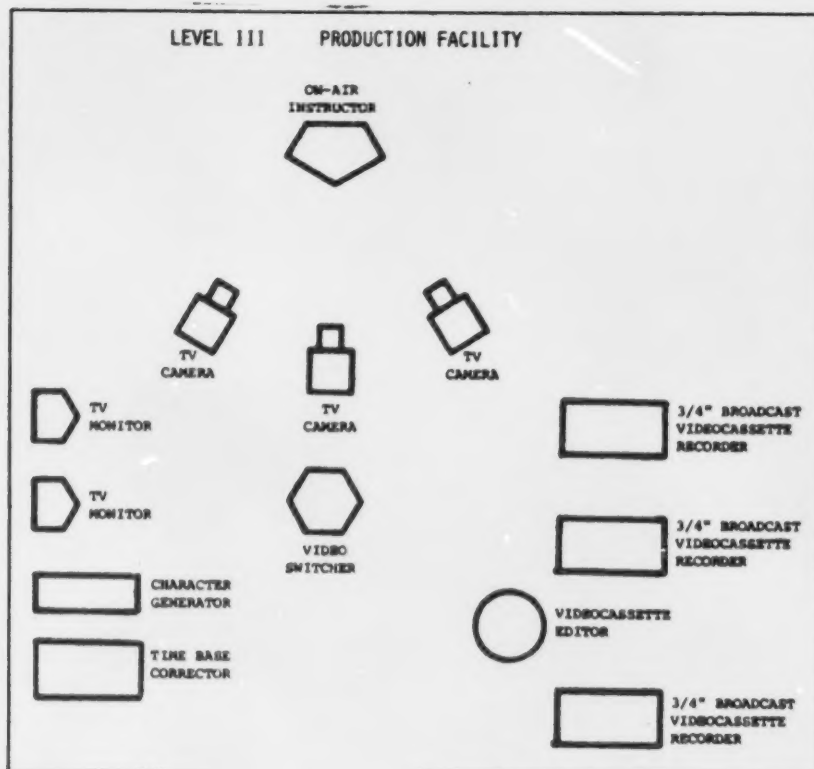
Equipment Component	Costs
1. Color Cameras (4)	\$280,000
2. Videotape Recorders	\$396,000
3. Editor	\$ 35,000
4. Video Switcher	\$ 55,000
5. Character Generator	\$ 12,000
6. Monitors	\$ 45,000
7. Test Equipment	\$ 30,000
8. Audio Equipment	\$ 15,000
9. Assc. Video Equipment	\$ 35,000
10. Misc. Racks, Carts	\$ 18,000
11. Misc. Cables, Connectors	\$ 15,000
Sub-Total	\$936,000

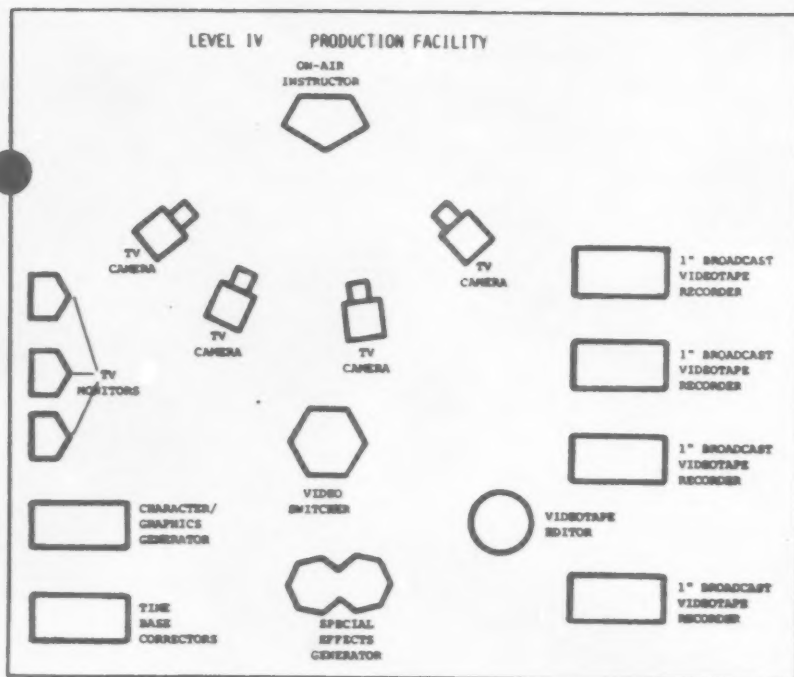
Personnel Component	
1. Studio Director	\$ 25,000
2. Floor Manager	\$ 18,000
3. Video Switcher	\$ 18,000
4. Engineer	\$ 20,000
5. Technicians (3)	\$ 42,000
Sub-Total	\$123,000

Other	
1. Maintenance Contracts	\$ 6,000
2. Replacement Parts	\$ 38,500
3. Basic Videotape Supplies	\$ 30,000
Sub-Total	\$ 74,500

The per-hour production cost, based on 1,000 hours of annual usage, is \$331. A typical 2-hour finished program involving 20 hours of production time would cost approximately \$7,650 or \$3,875 per program hour. The per-hour cost of producing a live one-hour program for broadcast would be \$993, including one hour for set-up and one hour for take-

down. The cost of producing a 3-hour college course at Level IV would be approximately \$25,500, not including the cost of the instructor.





The annual operating budget of a Level IV production facility is:

Equipment Amortization (7 yr)	\$133,715
Maintenance	\$ 38,500
Personnel	\$123,000
Supplies	\$ 25,000
Other	\$ 20,000
Sub-Total	\$340,215
25% Overhead	\$ 85,054
TOTAL	\$425,269

The chart showing Production Levels and Cost Comparisons outlines the costs associated with each level of production and provides an approximate cost to produce one 3-hour college credit course. These figures do not include studio or classroom space, instructor talent, or pre-planning and curriculum development costs.

PRODUCTION LEVELS AND COST COMPARISONS

CATEGORY	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
1. CAPITAL INVESTMENT	\$ 8,500	\$50,900	\$163,560	\$936,000
2. NUMBER OF PERSONNEL	1	1.5	3	7
3. ANNUAL OPERATING COST	\$22,500	\$55,750	\$137,344	\$425,269
4. PER-HOUR COST	\$15	\$40	\$94	\$331
5. COST OF TAPING ONE 3-HR COLLEGE-CREDIT COURSE	\$ 2,138	\$ 3,450	\$ 6,990	\$ 25,500

Storage Devices: Videotape Recorders

The most common storage device in use today for video information is the videotape recorder. The standard formats are reel-to-reel and cassette. The reel-to-reel format has two major categories, 1" and 2", both of which are used in

television broadcasting. The cassette comes in 1/2" and 3/4" size, the 1/2" being primarily for home use although its industrial and educational applications are growing more extensive. The 3/4" is currently the major format for educational, industrial, and remote taping applications.

It is important to understand that the videotape is not a telecommunications delivery methodology but, rather, a storage device. Programs can be taped and sent to individual locations for playback, but the delivery system is the U.S. Postal Service or the delivery person, not the videotape. The videotape itself is the storage device for the program; the physical distribution of the tape is the

delivery system.

Videotape instructional applications. Videotape has two distinct advantages: it is a relatively inexpensive storage device and can be user-recorded. These two advantages together have made videotape a valuable tool in the educational and commercial sectors. For the first time,

the educator is able to record a program he desires, edit it as necessary, and use it for classroom instruction. Previously, the only available tools were audiotape (which had no video component) and film (which required processing and fairly elaborate equipment to achieve both sound and sight). The videotape has given the instructor the ability to record the teaching activity of a student teacher and review it immediately so that the student receives both visual and aural feedback on his or her performance, in addition to the instructor's critical appraisal.

In interactive videodisc applications, the best instructional expertise in various subject areas could be "packaged" and made available at extremely low cost to every school district in the nation.

Very recently, videotape methodologies have been combined with small computers to aid in computer-assisted instruction and computer-based education. One of the major problems encountered in computer-assisted instruction is the use of video in its programs. Video and color graphics require enormous memory capabilities and have been available only through very large and expensive computers. However, the use of videotape as an auxiliary video storage device for micro and mini computers has created a new era in interactive instructional technology. The computer provides the logic; the videotape provides the program method. The computer is able to execute the program, play back the required sections of the videotape, and ask questions of the students. If the answer is correct, the computer will go on to the next section; if the answer is incorrect, the computer can either recall the section for the student to review, or it can "branch" to another section which may review the material in a different manner. All of this is automatic because the computer controls the videotape, and the student can progress at his or her own rate. The instruction can deal with almost any subject area, from mathematics and geography to dental and medical curricula.

Sony has just announced an add-on interactive device that will couple to existing videotape recorders and allow the program developer the ability to produce, in-house, his own interactive program. Because this device connects directly to the videotape machine and is easy to use, the developer or instructor does not need to have a technical team to construct the program. It is as easy to use as a hand-held calculator. The student has nine buttons by which to select the response or activity he desires. The device has an add-on option that produces a printed record of the entire instructional process. This

printed record will not only provide information on who used the videotape course, but will also list the responses made by the student, the number of correct and incorrect answers, and will even provide a grade if necessary. Thus, if an instructor wants to produce a segment

particular subject, he can produce it himself and make it available to many different students to use at their own rates, while at the same time maintaining a record of student use of the course. Because the course is stored on videotape, it can be easily duplicated and distributed for use in other locations. The in-house production and re-use of the videotape allows the instructor the flexibility of editing or updating segments as required.

Videotaped instruction does have its disadvantages, among them the following:

1. The initial investment requires a relatively large user group;
2. The access time (time required to find a particular section of videotape and replay it) can be relatively long, as much as 60 to 90 seconds. This delay cuts down

A teacher wishing to teach a session on Western Art will be able to take a videodisc out of the library and immediately have 50,000 pictures to choose from. And each can be called up immediately for classroom use.

grooveless disc which is similar in design to the RCA disc. However, since it does not use a groove, it can do some single-frame, slow motion, and reverse operations. There is still physical wear and some susceptibility to dirt. This videodisc should also be available in 1981.

The tremendous potential for videodisc technology, besides its obvious entertainment value, lies in combining it with micro and mini computers for interactive instructional programming. The factors that make the videodisc more advantageous than a videotape format are:

1. Extremely fast access time (less than 5 seconds for any of 50,000 individual frames of information);
2. No wear (assuming one of the optical systems is utilized);
3. Inexpensive duplication when hundreds of copies are desired;
4. Ease of use;
5. The low cost of players (from \$700 to \$1800).

Disadvantages are that the videodisc is expensive for low-use applications and, currently, cannot be user-recorded.

Videodisc instructional applications. The greatest potentials of the videodisc are in making enormous amounts of video programming and large numbers of still pictures available to many users, and in making computer-assisted instruction much more cost-effective so that large

computers, and their additional costs, will not be required. For example, a teacher wishing to teach a session on Western Art will be able to take a videodisc out of the library and immediately have 50,000 pictures to choose from. And each can be called up immediately for classroom use. Extensive slide collections, even if available, would not have to be painstakingly reviewed in order to find the appropriate art samples.

Further, in interactive videodisc applications, the best instructional expertise in various subject areas can be "packaged" and made available at extremely low cost to every school district in the nation. The use of a small computer

the flow of the program and can interrupt student concentration.

3. If large numbers of copies of the program are needed, other methodologies (namely, videodiscs) can do the job for much less money.

Storage Devices: Videodiscs

The videodisc is the newest technological advancement to become available for educational use. While the videodisc has been in development for almost ten years, it has only become readily available at the marketplace in 1980. Four basic, noncompatible types of videodiscs are currently in use: (a) optical reflective videodisc (developed by Philips); (b) optical transmissive videodisc (by Thomason CSF); (c) capacitance, groove type (by RCA); and (d) capacitance, grooveless (by JVC). Unfortunately, each requires a different player and, as yet, all are incompatible with one another.

The Philips videodisc is the most readily available. Sony, Pioneer, and MCA are marketing players for this format, which has been subject to more experimentation than the others. Briefly, in the use of the optical reflective disc, the disc information is read by a laser. The laser beam is directed to the disc and is reflected back to a reader. This means that it will never wear out, because a light beam is the only thing that touches the disc. The disc can be played backward, forward, in slow motion, or in freeze frame without any problem, and this provides some obvious advantages for instructional programming.

The optical transmissive disc is also read by a laser but, rather than being reflected off the disc, the light passes through the disc and is read on the other side. One advantage is that both sides of the disc can be read without having to turn the disc over. The disadvantage is that the disc is quite susceptible to dirt and/or fingerprints. General availability of this type of disc is projected for early 1981.

According to RCA, the capacitance, groove type disc is slated for delivery in 1981. Video information is stored on the disc and read in much the same way that a 33-1/3 rpm record player works: a stylus follows a groove and picks up the video information. The advantage is that both

the disc and player will be low in price. Disadvantages, which stem from the use of a stylus to read the disc, are: disc wear; susceptibility to dirt; inability to do single-frame, slow motion, reverse motion, or random access.

The fourth system is the capacitance,

with the material lets the student define his or her own level of ability and regulate the speed of the instructional process. This allows a teacher tremendous flexibility in preparing individual education plans for each student.

Another interesting and upcoming application is called "vicarious travel." If two or three video players are connected, a student can sit down at a television set and travel through a nuclear plant or an automobile engine, or follow the evaporation/rainfall cycle. If the student wants to look to the right, he or she turns a wheel or joystick to the right, and the micro computer searches the

videodisc for that segment of video and it appears on the monitor, just as it would appear if the student were there in person. It allows the student to travel to places and see things he or she might never have the opportunity to see. The possible applications of videodisc technology in the educational process are staggering. From these few examples, hopefully the reader will gather an idea of what is currently available and the many directions that this extremely useful technology might go from here.

Dissemination



Alan R. Blatecky is Director of Telecommunication Systems Operations at the Center for Excellence, Inc., P.O. Box 158, Williamsburg, Virginia 23185; (804) 229-8541.

This project is producing evidence of effectiveness and replicability

Telecommunications As A Comprehensive Medium For Teacher Education

By John A. Curtis

WILLIAMSBURG, Va. — The Center for Excellence, Inc. (CenTex) is the country's first educational telecommunications operations research laboratory for the study of television's usefulness in the delivery of services and of the operational requirements, cost-effectiveness, and techniques available to meet educational needs. Another first for CenTex is its development of America's first Comprehensive, Inter-active Telecommunications Privacy-Protected Educational/Medical/Social Services Delivery System (CIT-PEDS). This two-way telecommunications system delivers professional preservice and inservice education, as well as diagnostic-prescriptive special education and medical services, to recipients in the urban, suburban, and sparsely populated regions in the Tidewater area of Virginia. (The display called "CenTex Operations in Tidewater Virginia" shows this territory, and the components of the system and their inter-relationships are shown on the display called "The Basic Component of the CenTex CIT-PEDS Network.")

Started with private funding, CenTex began its basic research in telecommunications systems in 1973. In 1976, the results of its research led to support from Virginia's General Assembly. (House Joint Resolution No. 37, passed by the General Assembly in 1980, reproduced on this page, formally congratulated CenTex for its work.) Funds have also been awarded by the Virginia State Department of Education and, in 1978, the Division of Personnel Preparation of the Bureau of Education for the Handicapped (now the Office of Special Education) began its support of Project SETT-UP (Special Education via Telecommunications: Teacher Upgrade).

CenTex Operations in Tidewater Virginia



The State of Virginia has established a statewide advisory committee to review and make recommendations regarding curricula for Project SETT-UP. Needs assessment data suggest the types of courses to be offered, as well as specific topics of interest to teacher recipients of the programs. The curriculum for each course is also presented to local, regional, and state review boards prior to broadcasting.

Of the 41 courses offered between spring 1978 and fall 1980, 27 led to certification renewal, 3 led to college credit, and 9 gave recipients both certification and college credit. A sampling of course titles includes: Language Development (Mile-

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stones and Manual Signing); Counseling Families of Handicapped Children; Legal Aspects of Regular and Special Education Administrative Personnel; Psychopathology and Emotional Disorders of Children; Strategies for Effective Classroom Management; Teaching Techniques for Exceptional Learners; Evaluating Performance of Handicapped Children and Marginal Achievers in the Regular Classroom; Methods and Materials for Dealing with Individual Differences; Instructional Strategies for Teaching Problem Readers in Content Areas.

Numbers of sessions per course vary from 5 to 29, and total classroom hours per course vary from 5 to 37, although the majority cover 16 classroom hours. Among the 14 courses offered in 1979-80 alone, enrollment was as high as 261 per offering.

Project SETT-UP is experimental as well as demonstrable. While providing training and other special education and medical communications, its personnel seek to test the applicability of telecommunications delivery systems and to evaluate their costs. One outcome of this experimental work is the information shown on the "Telecommunications Technologies Analysis Chart." Another outcome is the comprehensive overview of instructional delivery via telecommunications by Alan R. Blatecky, which also appears in this edition of *Counterpoint*.

Evaluation

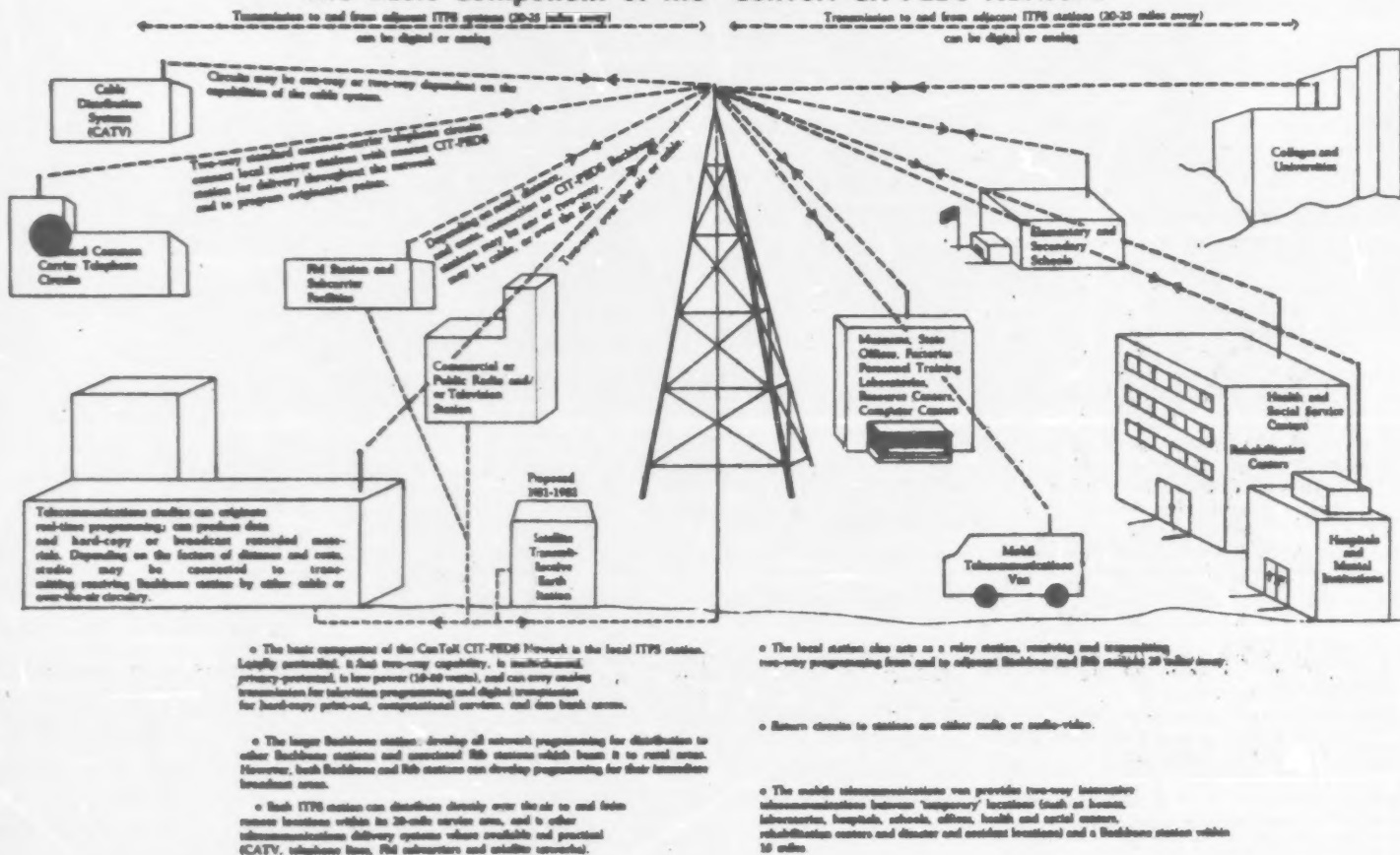
Centex has a three-phase test and evaluation procedure for its projects. Members of the evaluation team participate from "day one," even during planning stages, working alongside the project director and summing up results at the end of the project. Evaluation survey methods and project check-points are critiqued by nationally respected outside experts and members of Centex advisory boards before implementation and after the final project results have been analyzed.

While evaluation studies for the entire Tidewater peninsula are under way, this summary reports outcomes from specific teacher groups. Each course was evaluated by means of a written participant rating form. When relevant to the goals of the course, pre and post tests of

knowledge were also used. The effect of instructor interaction on grade and dropout rate was also examined.

Of the eight courses where knowledge tests were given, six courses showed statistically significant gains from pre to post values, using a 5% level of significance. Grades and dropout rates were examined to compare a class with one-way transmission with a pair of classes with two-way transmission which allowed interaction with the instructor. Students with interaction earned higher grades than those without interaction. Classes with interaction had no dropouts, while those with oneway transmission had a 23% dropout rate. The course evaluation form included information from 255 students. Most rated the overall quality of the courses high (79%) and

The Basic Component of the Centex CIT-PEDS Network



believed that television holds real promise as a training device (91%). The great majority also found television suitable to the subject matter addressed (89% and 83%), did not find the format hard to get used to (75%), and found it easy to interact with the instructor (73%).

To complement the evaluation results, CenTex has received a number of endorsements of the quality of Project SETT-UP, e.g., "After more than five years of direct experience with the CenTex special education programs, we are more convinced than ever that the combination of the CenTex needs assessment/curriculum development and innovative distribution strategies provides

the only economically practical means by which states can effectively implement all aspects of the required comprehensive personnel preparation plan on a timely basis" (James T. Michlem, Director, Division of Special Education Support Services, Virginia Department of Education).

TELECOMMUNICATIONS TECHNOLOGIES ANALYSIS CHART:
EDUCATIONAL/PSYCHOMEDICAL REQUIREMENTS VS. CAPABILITY AND COST FACTORS

	Analog Circuitry	Digital Circuitry	Real Time Capability	Direct Line Access	Easy User Access	24-hour Availability	Geographic Coverage	Two-Way Voice	Two-Way Video	Multi-Channel	Privacy	Economic Feasibility	Applicability to Distribution of Instructional/Psychomedical Services
AM Broadcasting Stations	yes	no	yes	no	no	yes	yes	no	no	no	no	C	D - meets few of the educator-specified requirements for a telecommunications delivery system.
FM Multiplexed Circuits	yes	yes	yes	no	no	yes	yes	no	no	no	yes	B	C - useful for some applications
Videocassettes	yes	yes	no	no	no	no	no	no	no	yes	no	B	C - useful as a storage medium; does not provide economic, real-time, easy user access or privacy
Public Broadcasting	yes	no	yes	no	no	yes	yes	no	no	no	no	B	C - useful only for general information and curricula distribution. No privacy
Normal Telephone Circuits	yes	no	yes	yes	yes	yes	yes	yes	no	yes	yes	A	C - no video, no digital capability
Special Telephone Circuits	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	B	D - wide-band circuits are often not available; always costly when compared with other media
CATV Circuits	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	B	B - Not available in many areas. Often does not have two-way capabilities, which can be costly.
Satellite Circuits	yes	yes	yes	no	no	yes	yes	yes	yes	yes	no	B	C - Equipment is costly, not easy to install or operate; will be useful for single channel distribution to sparsely settled areas.
ITPS Circuits	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	A	A - the only available methodology capable of meeting all education-developed system specifications

COMMONWEALTH OF VIRGINIA



GENERAL ASSEMBLY

HOUSE JOINT RESOLUTION NO. 37

Congratulating the Center for Excellence, Inc.

WHEREAS, the Commonwealth of Virginia has long been committed to providing life-enhancing as well as life sustaining services to the handicapped, the elderly, and the homebound and to furthering continuing professional education programs; and

WHEREAS, economic realities increase our recognition that these services can only be provided through the cooperative efforts of government agencies and concerned and compassionate private citizens; and

WHEREAS, the Center for Excellence, Inc., a private, nonprofit educational research organization, has for seven years been dedicated to disseminating vitally needed educational, medical, and social service information to the deaf, the blind, and the homebound, and to developing and distributing programs to improve the skills of educators and other professionals; and

WHEREAS, the Center for Excellence, Inc. established the first station in Virginia to provide two-way telecommunications to these populations; and

WHEREAS, John A. Crites, the founder and current president, and the other members of the Board of Directors of the Center for Excellence, Inc. have selflessly contributed of their energies and expertise by taking time from their demanding professional lives to serve the Center for Excellence, Inc. without receiving any remuneration; and

WHEREAS, the Center for Excellence, Inc. has developed a two-way educational telecommunications network, which, when completed, will encompass an area between Norfolk and Richmond, thereby serving one-third of the people of the Commonwealth; and

WHEREAS, the Center for Excellence, Inc. has perfected many sophisticated telecommunications methods, including systems to allow broadcasts to be relayed to select audiences, ensuring the privacy of the viewer and the suitability of the transmission; and

WHEREAS, the Center for Excellence, Inc. has received the support and endorsement of the Virginia Commission for the Visually Handicapped, the Virginia Council for the Deaf, the Virginia Department of Health, the Virginia Department of Education, the Virginia Department of Rehabilitative Services, and the Virginia Department of Mental Health and Mental Retardation, now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Center for Excellence, Inc. be congratulated on its many contributions in expanding the scope of information delivery services to isolated populations in Virginia, and, be it

RESOLVED *URTHER*, That the Clerk of the House of Delegates prepare a copy of this resolution for presentation to the Center for Excellence, Inc. in token of the esteem in which it is held by the General Assembly and by fellow Virginians.

Agreed to by the House of Delegates,
February 27, 1980

(Signature)
Clerk

Agreed to by the Senate,
February 25, 1980

(Signature)
Clerk

(g) Numerous conference and seminar appearances by SETT-UP's project director and his colleagues (with honoraria sometimes as high as \$1,000 plus expenses--all given to CenTeX) have and continue to help disseminate knowledge regarding Project SETT-UP and its funding among those whose professions are critical to all BEH major Special Education objectives.

3. Virginia State Department of Education Project SETT-UP Dissemination Efforts

The Special Education Division of the Virginia Department of Education has and continues to schedule lectures by SETT-UP personnel at all its major annual regional and statewide meetings.

Further, the members of two committees (the Statewide Curriculum Selection and Course Review Committee and the evaluation team--both selected and financed by the State Department's Special Education Division--) provide all regions of the state with inputs regarding the usefulness and evaluation data of Project SETT-UP and its state-financed sequel Project ITTS (Interactive Telecommunications--Teacher Special Education).

The State Department of Education also utilizes its publications to provide statewide reports regarding Project ITTS. A copy of the first such dissemination effort appears on the next page.

4. The Dissemination Impact of Department of Education's "American Education" Article Regarding CenTeX

Other than national TV news program stories about CenTeX, the most single significant national dissemination impact given CenTeX's BEH grant-financed programs was made by the November 1980 issue of the Federal Department's official publication, a copy of which follows the Public Education in Virginia reprint (next page).

CenTeX has found it most difficult and costly to answer effectively the inquiries generated by this article.

This front-cover highlighted, nine-page article, initiated by BEH's Dr. Harold C. Lyon, not only disseminated broadly in-depth Project SETT-UP information, but it has facilitated CenTeX's ability to secure for its curricula development some of the nation's best-known Special Education inservice teacher training experts.

Specification 3: "To make adaptive use of existing Special Education curricula and audiovisual materials in the implementation of project goals"

The preceding text makes very clear that Project SETT-UP met or exceeded this goal. It not only made maximum use of some of the nation's best-known

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Introduction

Two years ago, after determining that there was available no reference manual describing the major types of educational telecommunications systems, and after evaluating the potential usefulness of such a volume to educators in engineering, as well as those in other fields, the Publications Committee of the American Society for Engineering Education chose *Educational Telecommunications Delivery Systems* to be the subject of an ASEE monograph.

As a guide to compiling the monograph, the monograph editors selected as a working definition of America's educational goals one submitted to the National Academy of Engineering in 1972.¹ This specification stated that the nation's educational processes should:

- 1) Provide students the knowledge necessary to understand themselves, their environment, and their relationships with others, so they can effectively manage their lives;
- 2) Give students sufficient training and expertise (be it in shoe shining or in people management) to enable them to obtain their basic needs;
- 3) Develop within students the ability to adapt effectively to the varying requirements of a constantly changing world; and
- 4) Generate within students sufficient motivation to enable them to use their capabilities in ways that are constructive both for themselves and for the society in which they live.

It has taken 371 years (from the founding of Jamestown) and a number of far-sighted legislative acts and judicial decisions to create our nationally comprehensive

2000	
1978	
1962	The Golden Age: Progress in the Democratization of America's Educational System
1954	Supreme Court Outlaws Racial Segregation
1900	
1890	Federal Funds for Land Grant Colleges
1862	Morrill Act—Land Grant College Act
1852	Massachusetts Compulsory Attendance Law
1834	Pennsylvania Public School Law
1821	First Public High School, Boston, Massachusetts
1800	
1795	First State University Opens
1700	
1639	First School Supported Directly by Taxation—Boston, Massachusetts
1635	Founding of Harvard University, Cambridge, Massachusetts
1620	Landing of Pilgrims, Plymouth Rock, Massachusetts
1607	Jamestown, Virginia, Founded

Figure 1. Landmarks in American education.

educational system (see figure 1), and to come nearer to meeting our far-sighted egalitarian educational standards. We still have far to go, however, to realize our national educational goals. Further, costs of education continue to spiral upwards, and voluntary support of public education is decreasing as these costs rise. Without more effective use of its educational resources, the nation may be unable to continue its long struggle for equal access to education for all its citizens.

Threats to the Economic Viability and Public Support of Our Educational Processes

Factor One: *Failure of educators to control the critically spiraling costs of their services*

The following taken from the April 1977 issue of *Educational and Industrial Television* clearly supports this critical assessment.²

In dollars adjusted to reflect true buying power, the average per-pupil cost of America's public school system in 1947 was \$406; in 1957-58, \$733; in 1973-74, \$1,364. In brief, America's per-pupil cost has been doubling (in *adjusted* dollars) every ten years, and is still spiraling. Does the increased quality and quantity of school-level education justify this out-of-control factor? American voters apparently don't think so, for whereas in 1965 they approved 74.7% of the school bond issues submitted to referendum, in 1975, they approved only 46.3%.

Factor Two: *Education's ever-expanding responsibilities*

America's is a technology-based society, and its educational processes are expected to keep up with the needs of a dynamic, fast-changing democratic society. New socio-economic factors and ever-expanding technological information continue to increase the depth, number and types of educational requirements. Lifelong education, computer power distribution and education of the handicapped are but three of the many new responsibilities of our educational processes. New responsibilities, as well as inflation, are contributing to the spiraling (and, to the public, alarming) rise in the cost of education.

Factor Three: *Educators are not meeting consumer requirements*

Time and geography still shackle our educational processes. Those who wish to learn usually must go to a certain place at a specific time for the education they need to get a job in the first place, and the continuing education needed to keep it.

America has, indeed, spent billions of dollars during the last quarter century to develop teaching expertise and materials, but has spent very little to develop more efficient ways to meet the third dimension of its education processes: distribution.

This failure has contributed substantially, many believe, to the frightening rise in educational costs and has restricted the "consumer" use of America's educational processes.

Table 1, (see next page) published in *Engineering Education* and based on data prepared for the National Academy of Engineering's Advisory Committee on Issues in Educational Technology, indicates the significance of our unfilled educational needs.

Factor Four: *Educators have failed to make intensive use of modern technologies*

According to statistics from the National Center for Education Statistics, three of every ten of America's 214 million persons are currently direct participants in the nation's educational processes—62.3 million, including 58.9 million students, 3.1 million teachers and 300,000 administrators and staff employees. Further, the current annual cost of our educational system is running in excess of \$180 billion. Thus, our educational systems are the nation's third largest industry, exceeded only by petroleum and retailing. During 1975, education represented 7.8 per cent of the total national product. Yet in terms of per-employee production, education is probably the lowest of the country's top ten producers. (See figure 2.)

Many critics believe that education is the only major American industry which does not yet make intensive use of modern technologies to reduce its costs and to increase the scope of its services.

Innovative Capabilities and the "Crisis in the Classroom"

There is reason to expect greater use of technology in the future in our educational processes. Since 1954, for instance, educators have been effectively but slowly trying to develop new ways to stem the rising tide of per-student costs.

One of the most promising ways to increase the geographic scope and effectiveness of America's educational processes appears to be the use of modern telecommunications technologies.

There are currently six major telecommunications methodologies delivering

Table 1. America's Potential Student Body.

	Total by Category	Those Now Being Served	Those Not Being Served	% Not Served
1) Pre-school young (no curriculum, no communications links)	11,424,000	3,949,000	7,475,000	65.4%
2) Physically handicapped & homebound (no communications links, no accomodation of the curriculum)	389,500	191,946	197,554	50.7%
3) Lower economic classes (unable to afford direct or indirect costs)	16,000,000	7,000,000	9,000,000	56.3%
4) Communicatively disordered — deaf, blind, dyslexic (system presupposes entering behaviors which these people lack)	2,934,500	1,493,672	1,440,828	49.1%
5) "Educationally averted" dropouts (past reinforcement from the system leads them to predict more 'failure experience')	7,636,800	(Elem. 4% High 24% Coll. 50%)	1,473,800 3,552,000 2,611,000	
			7,636,800	
6) Aptitudinally unique (same as # 4)	3,783,000	1,195,000	2,588,000	68.4%
7) Basic skills — deficient (same as # 4)	665,000	221,000	444,000	66.8%
8) Incarcerated — institutionalized (same as # 2, neglected & juvenile del.)	175,000	175,000	NDA*	
9) Socially-culturally different (system presupposes values which they do not have)	340,000	215,000 Migrant 125,000 Indian	NDA*	
10) Geographically remote (same as # 2)	1,500,000			
11) Temporarily out of phase (night)	1,500,000	1,500,000	NDA*	
12) Older & retired (same as # 2, poss. # 3)	275,000	25,000	250,000	90.9%
13) Spec. educ. training skills (mgmt. etc.)	13,000,000	13,000,000	—	
TOTAL	58,123,600		21,395,382**	
14) Formal Education		1970	1975	
K-12		51,600,000	51,000,000	
Undergraduate		6,662,000	8,368,000	
Graduate		946,000	1,334,000	
Noncredit		666,000	962,000	
Part-time credit		1,576,000	2,043,000	
TOTALS		61,450,000	63,707,000	

*NDA — No data available. Figures rounded to nearest 1,000. Revised 4/5/73.
Source of Data: U.S. Office of Education and the Department of Commerce.

**If drop-outs are included,
this figure would be 29,032,182.

See Curtis, J.A., "Recommendations for a National Educational Telecommunications Network," in the *Proceedings, FIE Conference*, ASEE, 1973, and Curtis, J.A., "Needed: A National Telecommunications Network for Education," *Engineering Education*, May 1974.

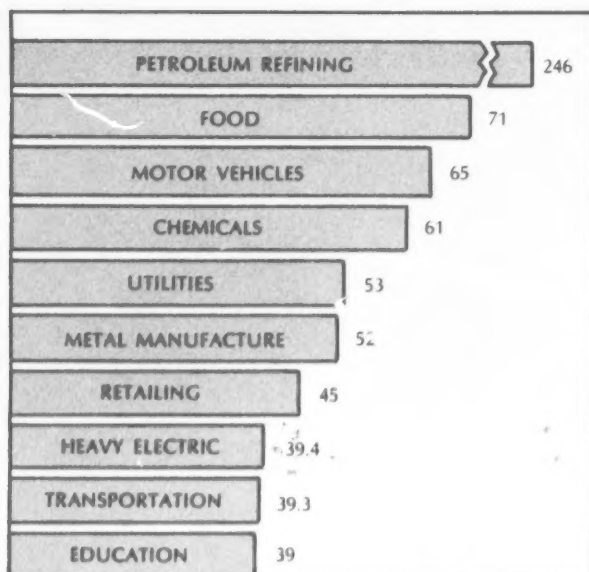


Figure 2. Revenue per employee for various U.S. industries (in thousands of dollars).²

educational services every day to major segments of students. Together, these methodologies have demonstrated their ability to distribute *effectively*, the "cradle-to-grave," diverse education so essential to our well-being and democratic future. So far, only one federal agency (the Federal Communications Commission, which assigns our frequency spectrum resources), and one federal bureau (the Bureau of Education for the Handicapped) have demonstrated the farsighted statesmanship essential to the proper, continuing development of this new, major educational tool.

Although very different in equipment specifications, operating procedures and cost requirements, the six major educational telecommunications delivery methodologies have one common denominator: They all have the ability to break the shackles of *geography* and *time*—factors which so drastically limit access to most educational systems. Telecommunications methodologies enable educators, for the first time, to deliver education where and when the consumers, not the manufacturers, of education want to buy and use it.

These methodologies have also demonstrated their usefulness in the area of cost control. They assist this important objective by enabling educators to:

- 1) Bring resource materials and teaching expertise from remote locations to supplement the teaching expertise and programmed information of the classical classroom; and to
- 2) Increase individual teaching productivity by enabling the instructor to teach from a central point one or more student bodies in remotely located classrooms (be they a home, a hospital, a rented store front or the conventional school or campus classroom).

Six Major Educational Telecommunications Delivery Technologies

The six major U.S. educational telecommunications methodologies are as follows:

- 1) Public Broadcasting (radio and TV)
- 2) Instructional Television Fixed Service (ITFS)
- 3) Teleconferencing-Teletyping (via standard telephone circuits)
- 4) FM-Broadcasting Station Multiplexing
- 5) Community Antenna Television (CATV)
- 6) Satellite Circuitry

In most instances, each of the six major educational telecommunications methodologies has been initiated to meet differing student body needs and delivery requirements. Each is therefore likely to have its own group of proponents. These methodologies have yet to be integrated into a coherent, coordinated educational delivery system, even on a local operating level, let alone on a statewide, regional or national level.

These differing factors make it difficult to prepare one comprehensive, in-depth analysis of current uses and costs of educational technology and identify the likely future applications and operating costs of more than one telecommunications technology. There are, however, operators/users/managers who have operated and studied one or another of these systems over a long time.

We have selected one or more such experts from each of the six educational fields of telecommunications to prepare papers regarding the particular field in which each has special knowledge.

Obviously each author is likely to be an advocate of the particular methodology in which the author has time-based confidence and experience. To balance this possibility of prejudice, we have asked Bert Cowlan, the H.L. Mencken of educational telecommunications critiquing, to cast his discerning eye and sharp wit on the contents of each contribution. The editors believe this monograph to be the first reference manual to provide in a single volume an overall review of the current status and likely near-future application of the six major educational methodologies by professional advocates of their use.

*John A. Curtis
Joseph M. Pietenbach*

REFERENCES

1. Written and submitted by John A. Curtis, December 1972, to the Advisory Committee on Issues in Educational Technology, National Academy of Engineering.
2. Curtis, John A. and Alan R. Blatecky, "Project TIMES-Telecommunications in Medical and Educational Services," *Educational and Industrial Television*, April 1977, pp. 35-42.

John A. Curtis is founder and chief operations officer of the Center for Excellence, Inc., in Williamsburg, Va. Joseph M. Biedenbach is director of continuing education, College of Engineering, University of South Carolina, Columbia. Dr. Biedenbach was chairman of ASEE's Publications Committee when plans for this monograph were approved.

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Instructional Television Fixed Service: A Most Valuable Educational Resource

John A. Curtis
Center for Excellence, Inc.

In 1961, the Federal Communications Commission (FCC) issued the Plainedge School System (Plainedge, L.I., New York) an experimental license to initiate what is believed to be the FCC's first authorization to use television circuits in the then relatively uncrowded 2000-megacycle frequency range to distribute *structured, curricula-integrated* programming.¹

Plainedge's pioneering not only helped to stimulate the subsequent appropriate Congressional and FCC actions, but also caused FCC Commissioner Robert E. Lee, long the Commission's most knowledgeable educational TV exponent, to say, after viewing the Plainedge installation in 1963, "It may well be that Plainedge, New York, will be to education what Kitty Hawk, North Carolina, was to the aircraft industry."²

In May of 1962, the U.S. Congress, recognizing the educational potential of television, amended its Communications Act of 1934. This amendment provides for "Grants for Educational Television Broadcasting Facilities" (PL 87-447, 87th Congress).

The FCC, itself a Congressionally mandated and monitored regulatory body, constructively reacted to this Congressional action by setting aside, in July 1963, the 2500-2690 megahertz band to provide 31 six-megahertz channels—on a *non-exclusive* basis—for the then-new Instructional Television Fixed Services (ITFS).

When recognition of the educational significance of ITFS became more widespread and when solid-state equipment became available, the usefulness of the ITFS spectrum became increasingly significant. Soon commercial, as well as educational non-profit services, began to petition the FCC for use of ITFS channels.

After holding hearings, the FCC, in June 1971, reduced from 31 to 28 the number of ITFS six-megahertz channels, but ordered that the 28 channels be exclusively for use in America's *non-profit* educational processes. The FCC further established operating rules and authorities to make the spectrum easy for educators to provide effective, low-cost distribution for most types of educational expertise and materials. Current FCC ITFS regulations, for instance, permit the distribution of audio-video (TV) programs and hard-copy materials, as well as relay networking. Their operating flexibility even makes possible, on an experimental licensing basis, the use of education's most effective teaching methodology—direct two-way

City schools (130)	County schools (81)	Universities (103)	Religion-related institutions (122)	Educational consortia/social service organizations (51)	Med. schools (10)
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*Figure 1. What educational services today extensively use ITFS channels as basic components of their educational processes**

audio-video contact between the instructor and the student. Today, therefore, for the first time in history, an instructor is able to 1) teach students in one or more geographically remote classrooms on the basis of direct face-to-face relationships; 2) deliver "written" materials to remote locations from a central point; and 3) has low-cost digital circuits available to access, control and distribute remote computational power and data bank information.

Without question, the 1971 FCC decision and its associated operating rules rank in educational importance and potential with the Land-Grant College Acts of 1862 and 1890, the post-World War II G.I. Bill, and with the social rights legislation and court decisions of the 1960s and 1970s.

America's educators have been given the means to break the shackles of both time and geography—restrictions which have heretofore not only limited access to America's two-way educational processes, but which have also restricted the net productivity of its practicing instructor to the student body of a single classroom or lecture hall.

During 1975-76, the Center for Excellence, Inc. (CenTeX)** conducted a survey called Project TIMES—Telecommunications in Medical and Educational Services—among a national sample of 63 ITFS operations. As a group, these operations represented a national statistical matrix of the then existing 90-odd ITFS system operators.

During 1977-78, CenTeX researchers followed up with face-to-face, system-operations inspections of 23 of the 63 school, college and university ITFS operations included in the original survey. This national matrix was used to determine where and how ITFS was being used, and where and why it had gained or lost educational significance during the two years since the 1975-76 survey.³

The restudy found that ITFS systems are making major contributions to four major areas of America's educational processes and are beginning to make major contributions in two others. These six areas are: 1) public schools, 2) private schools, 3) graduate schools, 4) medical schools, 5) social services, and 6) rural educational and medical services (see figure 1). Survey findings regarding each of the six areas will be summarized.

*Many of the graphs in this paper were developed by Alan R. Blatecky, Director, Telecommunications Operations, CenTeX.

**An IRS-recognized, non-profit, Virginia-chartered, educational/medical/social services research and resource development corporation centered in Williamsburg, Virginia.

I—ITFS in Public School

CenTeX restudied 11 public school ITFS systems of the total of 26 surveyed two years earlier. The restudied school systems are in Newburgh and Fredonia, New York; Altoona, Pennsylvania; Birmingham and Jefferson County, Alabama (one system each); Broward County, Florida; Richardson County, Texas; Long Beach, Anaheim, and Fresno, California; and Milwaukee, Wisconsin. The major findings of the restudy program for this sector of ITFS users are as follows:

- 1) All but one of the 11 operations studied have been functioning for eight or more years—some for as many as 13 years.
- 2) As a group, the operators expanded their systems by 12.1 percent during 1977. This compares with an expansion of 12.3 percent projected by the original CenTeX study.
- 3) One of the 11 restudied operations is—for all practical purposes—off the air. This represents an attrition rate of 6.06 percent; a 6 percent rate had been projected by the original study. (This off-the-air system is scheduled to go back on the air.)
- 4) On the other hand, the restudied school ITFS stations expanded their channel capacity by 12.1 percent during 1977. As a group, therefore, they had a net growth of 5.5 percent.
- 5) This net growth was financed by *non-federal* sources on the basis of the usefulness of the services delivered to the school children of the systems' constituencies. This 5.5 percent growth rate *does not include new ITFS school-installations* by new-to-ITFS school managements. (These are discussed later.)
- 6) As a group, the 11 restudied school operators plan a 24.24 percent expansion during the next two-year period.
- 7) The school managements believe ITFS enables them to provide educational services which could not otherwise be made available to their student bodies. Their thinking in this regard is specific and may be summarized as follows:

• *ITFS can provide the multi-channel services which school telecommunications systems need.* Three of the 11 school managements had access to public broadcasting channels at the time they did their initial studies on the feasibility of ITFS and made the decision to use it. All three gave these reasons for their need to switch from one television methodology to the other:

- 1) To serve simultaneously more than one level of an educational system requires the use of more than one or two channels. Limited channel capacity creates intolerable restrictions on program diversity and also makes for critical scheduling problems. (*Four-channel* systems appear to provide adequate capacity except for operations involving multi-service, consortia-type operations.)
- 2) Even the same educational levels have different materials and scheduling requirements at different school locations operating under different teacher requirements.
- 3) Only a multiple-channel, school-operated system can be made into an integral and basically important part of the school educational and

administrative processes. (ITFS operating rules and its low-power requirements combine to make it easy for school systems to operate ITFS systems.)

- *ITFS supplements teacher capabilities.* The idea that television replaces the teacher is a myth. ITFS service does, however, enable the teacher to do a better job. Few teachers can possibly teach all the things they must teach equally well. For example, with writing skills, a teacher may have difficulty demonstrating the correct form of a letter but, via ITFS, the proper graphic presentation can be effectively demonstrated.

- *ITFS adds teaching services and expertise as required.* Consider the slow learner in a normal classroom. No teacher can turn her or his back on the teaching needs of 20 or more pupils to give the special attention needed by the "exceptional" child. With ITFS, the slow learner can be provided with supplementary instruction and (by using a headset) this instruction can take place in the pupil's regular classroom during the regular class hours. In this way, for instance, ITFS can deliver special reading or math instruction, tailored to meet individual pupil requirements, to the below-grade-level student without embarrassing the pupil.

This same methodology can also be used to provide challenging special programs for the gifted and high-achiever who finishes lessons faster than the average pupil.

- *ITFS can be an effective communications—as well as teaching—medium.* School administrations can use ITFS systems as communications links between themselves and teaching faculties. Each school in a system develops its own corps of teacher-leaders, its own personnel problems, and its own barrage of questions. Administrators can invite faculty representatives from the local schools to meet with the superintendent and his or her staff, and such meetings can be broadcast via ITFS back to the faculty groups who have gathered for the purpose in their remotely-located school rooms or auditoriums.

- *ITFS circuits protect privacy.* ITFS is privacy-protected and, by virtue of its specialized equipment, closed-circuit. Thus, representatives can present locally-generated questions and concerns, and only those authorized to do so can be invited to hear the answers and discussions regarding them. (Under the privacy provisions of the 1934 Communications Act, unauthorized listening in on ITFS circuits is likely to be a felony.) In similar fashion, ITFS can make practical the use of this same communications methodology for administration/student body liaison for one or all of the schools within a given school district.

- *ITFS makes possible the specialized daily-living curricula which students need but which would otherwise not be available.* Many school-aged pupils need down-to-earth special courses, such as How to Open and Use a Bank Account, What You Should Know about Nutrition, How to Apply for a Job, How to Fill Out an Income Tax Form, or How to Use the School's Guidance Department Effectively. Curricula in such subject areas must usually be developed by outside curriculum personnel. They often even require teaching expertise by non-school personnel, and usually require one-of-a-kind course materials for which preparation and teaching dollars are hard to find, but which may be made available by public benefactors outside the school system.

ITFS enables school curriculum managers to acquire and deliver from outside sources specialized, but perhaps critically needed, individual, "how-to-live" courses.

- *ITFS encourages pupils to be creative.* Telecommunications make possible innovative development programs which would otherwise never be initiated. Because young people feel at home with TV, and because TV holds a high level of credibility with them, teenagers are quick to use ITFS to develop their own programs (and creative talents).

- *ITFS is a dynamic teaching tool in the classroom.* TV moves effectively and adds efficiency to the classroom teaching process. Curriculum content can be carefully prepared and tested before being regularly-used.

- *ITFS serves the homebound pupil more effectively and at lower cost than other methodologies.* An ITFS system can be used to instruct the homebound by increasing the amount of teacher expertise that can be delivered and by decreasing the teacher's travel time. For instance, a teacher can present a lesson from a remote location instead of travelling to the homebound student's location and can simultaneously teach students at two or more remotely located homes or "special" institutions.

- *ITFS can be used to eliminate fear of tests.* By enabling a pupil to take typical quizzes on his own, ITFS can be used effectively to prepare the pupil for testing situations—both those met during the school educational process and those that must be faced in adulthood.

- *ITFS is an effective in-service teacher training tool.* One good instructor can simultaneously teach remotely located groups of teachers. Teacher representatives from local schools can meet, exchange experiences and share real-life teaching experiences with their remotely-located colleagues. For this type of application, ITFS systems have no peer.

- *ITFS lets pupils use their "open" time constructively.* If a pupil arrives early or stays late for non-school reasons, he or she can go to the auditorium for special enrichment programs. Pupils can also view ITFS programs during lunch or other recess periods, or when they have completed their lessons ahead of schedule. Thus, an ITFS system provides a means to increase the constructive use of "open" in-school time.

- *ITFS systems have a long life expectancy.* With proper maintenance, even tube-type ITFS systems can provide ten or more years of active, full-time daily service. When technological obsolescence or equipment redesign occurs, however, replacement parts become hard to get and maintenance is more difficult to perform.

- *ITFS puts the control of education in the teacher's hands.* Because of its multi-channel capabilities, ITFS systems put the control of the teaching process where it belongs—with the teacher, not with some schedule arbiter. Teachers therefore can use the system to meet *their* specific requirements and the needs of their individual pupils on a "when, where and what's needed" basis.

- *ITFS-delivered school curricula.* As illustrated by table 1, ITFS school systems are being used to distribute programs pertinent to the teaching of varying, across-the-board curricula—reading and science; literature and health sciences;

Table 1. Categorical Summary of Curricula Distributed by
35 ITFS School Systems.

<i>Subjects/ Curricula</i>	<i>% of 35 schools using ITFS to deliver specific subjects</i>	<i>Subjects/ Curricula</i>	<i>% of 35 schools using ITFS to deliver specific subjects</i>
Arts and Crafts	74	Literature	89
Business Admin.	--	Mathematics	80
Business Education	29	Music	80
Community	3	Nursing/Pharmacy	14
Computer Science	3	Psychology	23
Engineering	--	Public Affairs	40
Foreign Language	51	Reading	80
Guidance	71	Religion	26
Health/Physical Ed.	74	Science	86
History	60	Social Sciences	83
		Teacher Training	51

mathematics and music—and are especially useful in the teaching of the “basics” of school education as well as the arts, personal guidance, hygiene and the sciences.

• *Even four-channel ITFS systems operate during every school day.* The 35 initially surveyed school systems—even those which are four-channel systems—operate each of their channels *40-44 hours per week*, or more.

What Makes Public School ITFS Operations Productive and Successful?

The ITFS systems of the Birmingham, Alabama, City School System and Jefferson County (adjacent to Birmingham) began operations at about the same time over ten years ago. Each had four channels; each served similar numbers of school-aged children. After approximately ten years of operation, one system is still going strong; the other went off the air last year. Why? What are the requirements for successful operation of an ITFS system that serves education in the public schools?

CentEX posed these questions to Robert E. Dod of the Birmingham school. Here are some of the reasons he supplied for Birmingham's successful ITFS record:

- 1) The top administrators must be behind the project that pioneers ITFS use. From the beginning, Birmingham's school management wanted to make use of any ITFS capabilities likely to improve the quality of their school system's teaching processes.
- 2) From the very beginning, a team of technically and academically capable people must be formed to fuse the thinking and experience of their normally unassociated disciplines.
- 3) From the beginning, grass-roots knowledge of individual pupil and teacher needs must be meshed into the development and operational use of ITFS. Birmingham has a special office to maintain the needed liaison (two academicians, one director trained in the use of ITV programming, and an

experienced broadcast engineer). The librarian in each school is the appointed representative of this office, so that the ITFS management has its own "field commanders at the front lines" to keep communications open in both directions. This results in *needs-based* services and *prompt reaction* thereto. Further, keeping in close touch with teachers and pupils at the ground-level stimulates their interest; their thinking is promptly and accurately evaluated, and (to the extent of their capabilities) their vigorous participation can be encouraged and utilized effectively.

- 4) Those involved must keep abreast of technological changes and be prepared for them when they become practical. For instance, while most programming in the Birmingham school system in 1969 was live or on film, now—as improved tape technology has become available—75 to 80 percent of the programming is on tape. Initially only black-and-white cameras were used; now 80 to 90 percent of production is in color, and three new color cameras have been purchased.

Two years ago, when CenTeX, Inc., did its first in-depth ITFS survey, the Birmingham school system was producing 49 percent of its needed curricula. It now produces more than 60 percent, and another 25 percent of its curricula requirements are acquired by swapping arrangements with other Alabama school systems. Only 10 percent of the required curricula are now purchased, and 5 percent come from PBS.

ITFS School System Costs

What does it cost to build and operate an ITFS system for public school use? The 11 public schools participating in the ITFS update study have made available their fiscal data. These may be summarized as:

- *Capital Equipment Requirements.* Initial capital equipment costs (exclusive of building costs) average approximately \$275,000 per system. As a system builds its population and school-site coverage, however, system capital equipment and installation costs of serving 50,000 to 100,000 students can rise to approximately \$900,000. When public school systems are expanded to serve 150,000 or more students, in one instance, at least, capital investment (including building facilities) increased to \$3 million. The capital investment of the 11 restudied school ITFS systems average \$791,721 for a four-channel system.

- *Annual Operating Costs.* Annual operating costs of the 11 restudied school systems ranged from a low of \$44,258 to a high of \$738,100, depending on: 1) the number of channels provided, 2) the number of school sites included in the system, 3) the number of pupils served, 4) the geography of the distribution area, and 5) the amount of self-generated materials used by the particular system. The average annual operating cost of the 11 systems studied is \$219,000.

- *Per-Pupil Costs.* The teaching effectiveness of ITFS has been very carefully documented by all of the managements of the 11 schools studied, as have equipment life and maintenance costs. All but one of the operators of the restudied ITFS systems believe (and most have themselves demonstrated) that even tube-type ITFS systems have a useful life span of ten years. Using this experience as a statistical base, the average annual per-pupil cost of the 11 restudied systems is \$1.35 for capital equipment amortization, and \$3.77 for operating and teaching

materials costs. This makes a *total annual ITFS per-pupil cost of \$5.12*, a figure which includes equipment amortization, all material preparation costs, and all ITFS distribution system operating and maintenance costs.

II—ITFS in Private Schools

Private-school ITFS systems have been limited almost exclusively to Catholic archdiocesan systems operated in large cities. Four of these systems came within the CenTeX restudy matrix: the well-managed Instructional Television System of the Archdiocese of New York, initiated in 1964; the system of the Archdiocese of Milwaukee, which began operations in 1967; the technologically-progressive system of the Archdiocese of San Francisco, started in 1968; and the newest of these systems, which went on the air in 1976 and which is operated by the Archdiocese of Chicago.

Like the nonsectarian ITFS operations of the public schools, the Catholic ITFS systems serve school children. They also seek to serve the spiritual and social needs of their respective diocesan areas. For example, the magnificently equipped, comprehensive CTN/C system in Chicago reports that, in addition to serving 143,542 school children, it also provides programming to 2,200,000 people in community parishes and to 40,000 senior citizens, for a total non-school viewer population of 2,240,000.

Unfortunately, the management of the Chicago system was not willing to make the requested fiscal operating costs available. It did, however, provide its capital investment figures, and all requested data were provided by the other archdioceses. On the basis of the figures from New York, Milwaukee and San Francisco, these systems are obviously as well-managed as they are comprehensive in matters of geographic coverage and services offered.

Capital investment costs of the restudied diocesan systems are reported to run from \$650,000 to \$4,000,000. The average capital investment is \$1,970,000. The per-person-served costs of the Catholic ITFS systems are, indeed, the lowest of any similar, major ITFS operation in the nation—\$.33 for capital investment and \$3.98 for annual operating costs, for a total of \$4.32 per person, per year.

III—ITFS in Graduate Schools

For the most part, the use of ITFS at the graduate school level is directly related to dollars and cents and to the educational needs of American industry. Perhaps that is why ITFS systems operated for this level are primarily concerned with the delivery of courses in engineering and business administration, either for credit or for employee improvement.

CenTeX restudied in 1977-78 four graduate-level systems: TAGER in Dallas, which began operation in 1969 and now serves approximately 1,000 persons; Stanford University in Palo Alto, California, begun in late 1968 and serving about 5,400; the University of Southern California in Los Angeles, which serves about 1,328 and went on air in 1969, and IHETS (Indiana Higher Education TV System), begun in 1976 and serving a statewide population of 15,440. The total number of

graduate students served is 23,168. From the restudy, CenTeX noted these salient facts:

- 1) At the graduate-school level, ITFS services are paid for either by the student or by his employer. Unless, in the opinion of these two tuition-paying sources, the service is worth the price, the tuition income stops and the ITFS system that distributes this type of educational service ceases to function. All four of the restudied systems are producing sufficient income to be considered economically viable.
- 2) Since these systems are dependent on tuition-type income, the privacy protection clauses in the 1934 Communications Act are, indeed, a basic factor to their economic survivability.
- 3) Graduate school ITFS systems usually have longer "working hours" than do, for example, public school systems. Both have heavy morning schedules, but public school systems usually stop program distribution in the late afternoon. Graduate school systems, in contrast, continue their services until 9:00 or 10:00 p.m., and their normal daily schedules begin at 8:00 a.m.—five days a week.
- 4) Though most graduate school systems limit their programming to the engineering and business instruction needed by industry, the system operators surveyed, however, are beginning to distribute other educational courses. For example, USC broadcasts personnel-improvement courses that viewers in remote industrial classrooms can watch during lunch hours on week days.

IHETS (Indiana) goes the whole way. It is currently building itself into a statewide ITFS system, unassisted by satellite circuits. It is already distributing courseware in many graduate disciplines, including medicine, nursing, pharmacy, engineering and audiology. It offers continuing education courses, including curricula in mass transportation, labor relations and nursing home administration.

- 5) With the increased insistence by many states for continuing education programs to upgrade professional skills in such fields as law, engineering and education, the graduate school ITFS system is likely to become more widely used in the near future. Currently, however, its use is limited primarily to the states of Indiana, Texas and California.

The fiscal data developed by CenTeX in the restudy indicate the following per-student costs for graduate level systems: 1) annual per-student cost of capital investment—\$34.08; 2) annual per-student operating cost—\$79.05; 3) total annual per-student cost—\$113.13.

IV—ITFS in Medical Schools

One of the fastest-growing uses of ITFS distribution systems is in the medical field. State regulatory agencies have become more concerned with the continuing education of medical and allied health professionals. In fact, 14 states reportedly now have requirements for updating professional skills and knowledge for both doctors and nurses. Many professional societies now require their members to take continuing educational programs periodically.

With or without state or professional association requirements, and given the fast-changing information in the medical fields, health care professionals must have continuing education if they are to remain effective. ITFS systems can enable health care practitioners in all disciplines to receive such education during their "open" hours—in the office, at the hospital, or at home—and the privacy-protection inherent in ITFS systems can be used to make practical the delivery of medical programming, including actual clinical observations, to only those authorized to receive them.

The restudy project included personal interviews with the directors of four medical ITFS systems: the one operated by Emory University in Atlanta, Georgia, which serves approximately 9,000 medical personnel; the University of Alabama-Birmingham system serving 900 medical personnel; the Cleveland Metropolitan ITFS system, serving approximately 10,000 medical professionals; and the Indiana University Medical Network, believed to be America's first, comprehensive, statewide medical telecommunications system.

The nation's first ITFS medical network went on the air in 1969 in Atlanta, Georgia. The pioneering operation was initiated by the Pinkerton-Fulton-DeKalb Hospital Authority; was initially funded by the National Medical Audio Visual Center at the National Center for Disease Control (also in Atlanta); and is very ably managed by the Medical School of Emory University under the name Georgia Regional Medical Television Network (GRMTN).

When, at the end of 1971, the National Center for Disease Control reclaimed its funded equipment, the P-F-D Hospital Authority and Emory raised the dollars to replace it. Today, GRMTN not only makes substantial contributions daily to the medical capabilities of the Atlanta area, but the educational impact of its circulating medical library (with more than 700 titles) today is making educational contributions through the contiguous 48 states and Canada.

In Atlanta, GRMTN daily delivers medical educational programming to 31 medical institutions located within a 25-mile radius of the Emory Medical School central station. The daily programming averages not less than three hours a day, five days a week (Monday-Friday). In addition, several times each year, GRMTN broadcasts to its ITFS institutional subscribers an entire, coherent postgraduate course on a specific subject of timely medical concern.

Because both Emory, one of the nation's better known medical schools, and the National Center for Disease Control induce visits by many of the country's most capable medical practitioners to the Atlanta area, the quality and up-to-date accuracy of Emory's medical lecturers are likely to have wide, as well as timely, professional appeal and significance. To make these lectures available to Georgia's rural doctors, and to facilitate their reuse, GRMTN early began to record its lectures and to seek "subscribers" for its videocassette circulating library.

Thus, GRMTN, believed to be America's first ITFS and the nation's first developer of a medical cassette circulating library, has become a nationally effective, economically viable and ever-growing factor in North American medical educational processes. Further, both its telecommunications and library networks have been targeted and managed to provide effective educational services to all levels of the medical professions (students, interns, residents and practitioners) whether in urban Atlanta, rural Georgia or elsewhere in the North American continent. The following should also be noted: although federal funding first enabled Atlanta medicos to assess the educational usefulness of an ITFS medical distribution system, *no federal funding has contributed either to the capital investment* (to date more than

\$347,000) or to the annual operating costs (more than \$92,000 a year) of the GRMTN since the National Center for Disease Control withdrew its equipment in 1971.

Another ITFS medical network also requires special recognition. Whereas GRMTN is exclusively a privately-funded, *single-city* ITFS delivery operation using conventional delivery services to make videocassettes available to those home-state, city and rural areas not served by its Atlanta-based ITFS network, Indiana has built a *statewide* ITFS system, which today serves 38 health care institutions in 19 cities strategically located in all parts of the state. Like GRMTN, the Indiana network is managed by a medical school (the Indiana University School of Medicine in Indianapolis—I.U.), and its avowed major educational thrust is continuing medical education for its home state's physicians and allied health professionals. It is also important to note that, like Emory, I.U. serves both privately, as well as publicly supported institutions. Like Emory, too, I.U. is building a cassette library available for purchase by both in and out-of-state medical practitioners. Although the I.U. medical network made its first use of ITFS late in 1969 (shortly after Emory first began its ITFS operation), its circulating cassette library has not yet attained the scope of Emory's library operation. During 1976, for instance, 33 of the I.U. catalogued medical cassettes were distributed to 26 institutions outside Indiana.

The I.U. ITFS medical network, however, includes a talk-back circuit from the 38 remote locations served by the system. This operating feature has enabled I.U. to provide first-year medical training at seven regional centers. It is reported that this system feature has been a contributing factor in the 30 percent increase in the annual enrollment for I.U.'s Bloomington Campus pre-med student body.

Study of the capital investment and annual operating costs of the four studied medical networks (Emory, University of Alabama at Birmingham, Cleveland TV Association and I.U.) indicates that average annual cost per professional served (including both capital equipment amortization and operating expense) is \$13.16—a very low per-person cost for the delivery of critically needed continuing education and professional consultation to a highly technical and specialized field.

V—ITFS in Rural Education

In Chautauqua County, New York, a microwave system is used to establish a resource-center connection between the New York State University campus at Fredonia and the program production center of the Chautauqua County Board of Cooperative Educational Services. From the latter control, ITFS delivers programs to ten previously established, remotely-located translator installations which, in turn, regurgitate the ITFS-delivered programs to the rural service areas for which they were established. It is interesting to note that the translators were initially installed to extend to rural areas the public broadcasting programs of station WNED, operating on Channel 17, but whose signal can not be received in many of the valleyed rural and urban areas of the county. Thus, the translators perform a dual purpose: they distribute both the ITFS- and PBS-delivered programming at different hours of the day.

In Fresno, California, the county-managed school authority uses its ITFS

system to deliver structured curricula to schools with single teacher or limited staffs who teach at more than one class level. Since their students are often located in mountainous, low-population areas, Fresno's pioneering ITFS system, in operation since 1967, adds the necessary multi-level teaching capabilities which such populations need but cannot afford and therefore seldom get.

In the Tidewater area of Virginia, the Center for Excellence, Inc., is developing an all-ITFS system to serve the rural areas of the upper and middle Tidewater Peninsulas; the Virginia Eastern Shore (the Commonwealth's most poverty-restricted area) and Virginia's rural, eastern southern-tier county area.

Unlike the Chautauqua system, the CenTeX Virginia system has been designed to deliver simultaneously two or more programs, and has the additional advantages of system-wide circuit protection of privacy and return-circuit communication. Thus, the system being built by CenTeX in Virginia can serve as a distributing network for many rural requirements, such as medical services, as well as those of structured, two-way teaching and special education.

Since an ITFS circuit requires one-fifth (or less) of the dollars and spectrum space needed for the use of satellite circuits, the CenTeX system, like that in Fresno, is being built "from the ground up rather than from the sky down." Consideration of satellite-circuit use is limited to "long-line" circuit requirements, which operating requirements and common-carrier tariff levels may subsequently combine to justify.

VI—ITFS in Social Services

In the Chicago area, the Archdiocese, as has been previously noted, is using its ITFS system to deliver spiritual instruction and diocesan information to an estimated 2,200,000 parishioners. The same system is also used to provide special programs to more than 40,000 senior citizens.

In California's Bay area, the technically proficient Archdiocese of San Francisco uses its ITFS system to provide hospital patients with helpful information regarding their illnesses.

In the Peninsula area of Virginia, the Bureau of Education for the Handicapped (BEH) of the U.S. Office of Education (together with the Special Education Division of Virginia's Department of Education) is funding what may turn out to be one of ITFS's most dramatic and meritorious contributions to social services education.

Known as Project SETT-UP, this program recognizes the immediate need to upgrade all public school teachers in the area of special education. Under U.S. Public Law 94-142, public school systems receiving federal dollars (and most such systems directly or indirectly depend on federal dollars for a substantial portion of their funding) must provide instructional services to all handicapped children "in the least restrictive environment." To meet these new federal regulations, most educators believe that all general as well as special education teachers must be given structured, inservice teacher training in the highly specialized field of services to special children, including the physically and mentally handicapped and the emotionally disturbed.

Under the direction of BEH's Herman L. Saettler, CenTeX's Project SETT-

UP enables a *single* inservice, special education expert to deliver simultaneously the training necessitated by PL 94-142 to *ten remote school locations* via CenTeX's two-way telecommunications delivery system. Evaluation of first-year results from the use of this system caused James T. Micklem, director of the State Division of Special Education, to remark, "The CenTeX system may be the only way we can meet our obligations under PL 94-142 on a timely and economically practical basis."

Basic System Specifications

CenTeX's Project TIMES included intensive and extensive analyses of education's telecommunications needs. The study procedure featured personal interviews with administrators and teachers from all educational levels to determine their needs-based thinking regarding the potential usefulness of telecommunications. The study also made engineering analyses of all telecommunications methodologies available to meet the educator-stated telecommunications needs.

This component of the study clearly indicated the following are basic specification requirements for a comprehensively useful educational telecommunications system:

Analog and Digital Circuits. Educational requirements necessitate the use of digital as well as the more conventional analog circuits. Analog transmission is required for TV (audio-video) signals; digital circuits are needed for efficient, low time-and-dollar costs for hard-copy transmission and for accurate access to and retrieval from remotely located computer power and memory banks.

Real-Time Capability. Live (question-and-answer) interchange between instructor and students is essential for the effectiveness of many types of structured curriculum delivery.

Easy User Access. Quick, easy communication between instructors and students significantly improves the effectiveness of most types of structured curricula. Quick, easy instructor access to program production systems facilitates the efficient development of effective curricula. Putting tools directly in the hands of the user (be it a carpenter's hammer, a secretary's typewriter, or a teacher's telecommunications-delivery or curriculum-production "tool") usually significantly improves end-product capabilities and reduces end-product costs.

24-hour Availability. Only by distributing structured educational curricula, at least between the hours of 6:00 a.m. and 10:00 p.m., can many of America's unfilled educational needs be met, and the per-student costs of telecommunications delivery system reduced to viable economic levels. Further, some post-graduate and craft-skill educational processes (such as medical and blue-collar industrial upgrading programs) require multi-shift (or round-the-clock) delivery capabilities.

Multi-Channel Availability. The curricular requirements and schedules of different student bodies—especially at the pre-school, primary, elementary and secondary levels—usually vary. An effective educational delivery system must therefore have multi-channel delivery capabilities to meet simultaneously the varying, teacher-dictated needs of different student bodies—even those located in the same geographic or operational jurisdiction.

One-Way Audio-Video plus Audio-Return Capability. In some instances, such as engineering and business administration education, although audio-video circuitry is required from the instructor to the student, only a voice-return circuit is essential from the student back to the instructor.

Two-Way Audio-Video Capability (in special cases). Learning and use results have clearly demonstrated that *two-way* audio-video circuitry is essential to the effective teaching of some medical subjects, to the making of diagnostic/prescriptive medical and psychological analyses, and to distribution of laboratory or clinical courseware and skill training. Further, in many instances, cost-effectiveness, as well as teaching efficiency, justify the added costs of *two-way both-way* educational delivery systems.

Privacy-Protection Availability. The Educational Broadcasting Branch of the Federal Communications Commission has stated in writing that it believes that the privacy-restriction and penalty provisions of the 1934 Communications Act apply to the information transmitted by ITFS systems. Under these provisions, just "listening in" on ITFS systems constitutes a felony.

Circuit-privacy protection is essential to the use of telecommunications for the distribution of many educational services, such as those based on tuition fees (to protect the tuition-paying requirements essential to their economic viability) and those for which privacy is essential, such as psychiatric treatment.

The Economic Practicability Factor. To be economically practical, educational telecommunications systems must either increase student access to educational processes or increase instructor capability to the extent necessary to pay for their costs and to justify the efficient use of available spectrum space.

The Usefulness Rating Factor. Even though an educational telecommunications system may be justified by its use and economic viability factors, a subjective evaluation or judgment must answer one over-all question: *Just how well and how deeply can an educational telecommunications system be integrated into a given educational process?*

The importance of the last question is emphasized by Helen L. Clower, who helped pioneer one of America's first comprehensive and operations-integrated ITFS systems—the Anaheim, California, City Elementary School District ITFS system. Anaheim has had 13 years to evaluate its ITFS system; based on results, the Anaheim television system has been allocated 4.2 percent of the 1977-78 instructional dollar. Three key points contributed to its success:

- The Anaheim ITFS system management first made grass-roots studies to determine their communications needs.
- Based on a definition determined by both teachers and administrators of the school system's major communication needs, the ITFS system management developed and published specific communication system goals.
- Based on these clearly defined needs and succinctly stated goals, the Anaheim ITFS system management proceeded to establish specific procedures to implement its objectives.

Anaheim's fact-based operations research and fact-based decisions have undoubtedly been among the key factors which have made its ITFS system an integral part of the school system's operation. Further, because the ITFS system is integrated into the school academic program, its usefulness can be regularly and accurately evaluated and its position as a budget-line item can be made clear at budget time.

Matching Telecommunications Technologies

Based on more than five years of continuing research, CenTeX analyzed all of the telecommunications methodologies today available to meet one or more of

the requirements which studies have indicated as major requirements of an educational/medical telecommunications delivery system. Table 2 (pp. 44-45) lists the basic practitioner-stated system communications capabilities (11 in all) and analyzes the nine major telecommunications technologies today available to distribute educational, rehabilitative, medical and social-services programming. Technical limitations and other salient factors appear to make unnecessary any further consideration of three of these nine methodologies. Referring to table 2, these three are:

AM Broadcasting; Videocassettes (are useful to store information, but some delivery-system capability must be provided. Cassettes are not telecommunications delivery systems); and *Special Phone Circuits*. Without wide-band circuitry on system-wide bases, the use of common-carrier telephone company facilities for educational/medical audio-video one-way and two-way programming is economic suicide. Recent comparison of estimates for a two-way audio-video circuit for a CenTeX studio-transmitter link of about 1.4 miles showed that ITFS could supply the same circuit capability as the Bell System for approximately one third of the phone company's quoted cost.

Each of the remaining six communications technologies in table 2, however, can effectively provide educational/medical telecommunications for *differing types of program objectives and program content*.

FM Multiplexed Circuits, Commercial and Public Radio

FCC rules currently authorize the use of a 6000-cycle spectrum component of a 30,000-cycle FM radio channel for the modulation of a subsidiary discrete channel which, in effect, "piggy-backs" on the main FM carrier. Since the use of this Subsidiary Communications Authority (SCA) channel does not noticeably deteriorate the reception of the listener of the programming on the primary station channel, FM operators are happy to make bi-product, productive use (and "sale") of the SCA channel. Special low-cost SCA receivers (selling for \$55-\$80) enable listeners to receive SCA-distributed programming.*

Currently, this "second" channel is being effectively used to distribute data and information, narrow-band musical programming (such as Muzak) and slow-scan television programs. Further, the SCA channel can modulate special audio receivers for the visually impaired, homebound and aged, teletype machines for the deaf, and Braille machines for the deaf and blind.

Rental of the FM subsidiary carrier circuits of 50,000-watt stations currently is running between \$3,000 and \$5,000 a year. In the instance of the commercial station, the rental payment is likely to take the usual format of direct-dollar payment for the SCA channel use; for the non-profit Public Radio station, the channel rental payment is likely to be made in the form of a gift.

Experience shows that the ground pattern of the SCA channel of a 50,000-watt FM station, has a 25-30 mile radius⁴ or a ground coverage of approximately 1,962 miles.

The currently low SCA channel cost, the low cost of individual receivers, plus the large propagation area served by a 50,000-watt FM station combine to make this telecommunications methodology an ideal one to deliver narrow-band signals, such as those for the handicapped mentioned above.

*Sections 73.294 and 73.319 of the FCC's rules describe the operating privileges and restrictions of SCA channel use.

Table 2. Telecommunications Technologies: Educational/

<i>Communications Technology</i>	<i>Analog circ.</i>	<i>Digital circ.</i>	<i>Real-time cap.</i>	<i>Easy user access</i>	<i>24-hour availability</i>	<i>Multi-channel</i>
AM Broadcast Stations	yes	no	yes	no	yes	no
FM Multi-plexed Circuits	yes	yes	yes	no	yes	no
Videocassettes/Audiocassettes	yes	yes	no	yes	no	yes
Public Broadcasting	yes	no	yes	no	yes	no
Normal Telephone Circuits	yes	no	yes	yes	yes	yes
Special Phone Circuits	yes	yes	yes	yes	yes	yes
CATV Circuits	yes	yes	yes	yes	yes	yes
Satellite Circuits	yes	yes	yes	no	yes	yes
ITFS Circuits	yes	yes	yes	yes	yes	yes

Psychomedical Requirements vs. Capability and Cost.

2-way voice	2-way video	Privacy	Economic practic- ability rating*	Useful- ness rating*	Applicability to educational, rehabilita- tive, medical and social services program distribution.
no	no	no	C	D—	Meets few of the educator-specified requirements for a telecommunications delivery system.
no	no	yes	B	B	Useful for some applications: such as teletype circuits for the deaf; audio circuits for the blind; slow-scan TV for educational purposes.
no	no	yes	B	C—	Useful as a storage medium; does not provide real time access; has limited privacy; requires additional delivery system to reach student populations.
no	no	no	D	C—	useful only for general information and distribution; no privacy; excellent medium for cultural development/enrichment programs.
yes	no	yes	A	C—	No video, no digital capability; but useful for non-video distribution and student talk-back circuits in audio-video-out systems.
yes	yes	yes	D	D—	Wide-band circuits often not available; are usually costly when compared with other media circuitry.
yes	yes	yes	B	B—	Not available in many geographic areas; often does not have 2-way capabilities, which can be costly when available.
yes	yes	yes	D	C—	Equip. costly, not easy to install/operate; useful for single-channel dist. to sparsely settled areas. Req. 5-6 times other media frequency spectrum and dollars.
yes	yes	yes	A	A—	Only available methodology capable of meeting all educator-developed system specifications.

*A = Good
B = Fair

C = Poor
D = Not useful

Although SCA circuits cannot provide two-way capability, a telephone circuit can be rented for this purpose. It is important to note that, though protected by the privacy provisions of the 1934 Communications Act, SCA receivers are inexpensive and relatively easy to obtain and/or make. Unauthorized persons may therefore be able to eavesdrop, and the privacy of an SCA circuit is, of course, always open to all who have receivers tuned to the SCA channel serving a specific geographic area.

Public Broadcasting—TV

To assess correctly the educational usefulness of Public Broadcasting TV, the following factors regarding this telecommunications methodology must be considered.

Public TV must compete with commercial TV for the general listener's attention. Public TV station managements, therefore:

- 1) Must develop programming which contains a high percentage of entertainment appeal;
- 2) Must maintain costly studio equipment and the specialized, expensive staff able to meet the standards of competing commercial entities; and
- 3) Must maintain high-powered transmitters to produce the audience numbers and broad public interest essential to their survival.

Because Public TV stations are costly, high-powered operations designed to distribute programming over a wide geographic area, it is difficult to make them a "teacher's tool." In most instances, there is a substantial studio crew between the teacher and the finished educational program, and it is difficult to produce (or justify economically) the development of specific programs for use by specific student bodies.

Even when the needs-based curricula are available, Public TV cannot provide the flexible schedule required to meet the varying needs of multi-school operations and locations. For instance, high capital equipment and operating costs and available frequency spectrum have limited the number of Public TV broadcasting stations in given geographic areas to one—and sometimes two—programmable channels. Educators point out that a single school district usually requires the use of more than two channels and that the geographic area served by a Public TV station usually includes *four or more* separate school system operations.

Harlan N. Levich, assistant director of the Instructional Resources Radio-TV Office, Long Beach, California Unified School District, summarized this point* as follows:

The two-year feasibility study . . . indicated . . . the Instructional Television Fixed Service system . . . was much less expensive than a cable, VHF, or UHF system and the four channels provided four times as much flexibility in programming as any single channel. The ITFS system also gives us a privacy not otherwise available for those times when we wish to broadcast strictly for "the team."

Three other factors make it difficult for Public TV to meet the needs of America's structured-curricula educational processes:

- During evening hours, Public TV stations must use their distribution power

*In a memo to his teachers.

to deliver general-interest programs. Their services are therefore not available to educators during a time period critical to the delivery of parent and professional training.

- Public TV is a one-way audio-video system. It therefore requires an *added* system to provide either an audio or audio-video return circuit when needed.
- Public TV stations are general broadcasters, and thus the privacy provisions of the 1934 Federal Communications Act do not apply to the programming they distribute. Public TV accordingly cannot meet many of education's most critical distribution needs, requiring such protection (such as psycho-medical, medical and tuition- or fee-based and special educational programs).

A recent survey by Virginia's State Department of Education appears to support the validity of the preceding assessment. During 1976, the Department surveyed approximately 6,000 (about 9.3 percent) of Virginia's total public teaching staff. Since it had been spending almost three million dollars a year to help support Virginia's five public TV stations, the Department wanted to know what its dollars were producing educationally.

Approximately 3,500 of the 6,000 teachers answered the questionnaire. Asked for "*judgments of the effect of public instructional television (Public TV broadcasting) on student learning*," the percentage of responses to the seven questions asked were as follows:

Improved it greatly	7%
Improved it somewhat	27
Improved it slightly	18
Had no effect on it	10
Had a slight negative effect on it	0
Had a substantial negative effect on it	0
I do not know	38
	100%

In other words, only 7 percent of the respondents considered public broadcasting an important factor in student learning, and only 34 percent believed public TV broadcasting is an even "somewhat" effective teaching tool.

As a distributor of *general*, cultural and educational programming (rather than structured, needs-based educational programming), however, public TV broadcasting probably has no equal in the educational TV field.

Normal Telephone Circuits

The senior citizen of audio telecommunications, the normal telephone circuit, which is almost universally available, and its more recently developed offspring, teleconferencing methodologies, are probably the most underpublicized of all available educationally-useful telecommunications delivery tools.

All over the nation telephone circuits are being used by educators for talk-back purposes (from student to remotely-located instructor). Depending on many factors, including distance, the use of common-carrier telephone company circuits for talk-back purposes (provided audio-only communications is required) is both effective and practical.

In at least one instance, the lowly standard telephone circuit is actually being

used by a state-wide, out-going, educational delivery system. The University of Wisconsin's Educational Telephone Network (ETN) is a system that supplies an instant and personalized educational channel to more than 120 Wisconsin communities. Wisconsin's Lorne A. Packer reports that during the 1976-77 academic year, ETN served approximately 30,000 people enrolled in more than 100 different courses at average per-student contact-hour cost of 25 cents.

Using telephone company circuits, Wisconsin has also developed a system which provides the means to transmit simultaneously both audio and visual materials. In this application use of telephone lines, images appear on a screen at listening sites at the same time the instructor draws them on an electrowriter. Thus, even relatively difficult courseware involving equations (such as calculus) can be delivered simultaneously to a number of "classroom" student groups remotely located from the instructor.

When narrow-band (3,000 cycles or less) transmission can adequately transmit the desired information, the use of the commonplace, *ubiquitous* telephone circuit obviously merits serious consideration by educators.

CATV Circuits

The unique and pioneering Shawnee Mission School CATV system (Shawnee Mission, Kansas) clearly demonstrates that CATV circuits can be highly effective for one-way audio-video, non-interactive, and non-real-time transmission of school-level structured educational curricula.

New York University's equally effective pioneering use of two-way CATV to create a real-time system to serve senior citizens in Reading, Pennsylvania, demonstrates quite clearly the potential of two-way CATV-based systems in the field of social services.

Despite these successes, however, CATV's subscriber growth rate has not been as dramatic as once expected, and in most geographic areas CATV systems reach less than 30 percent of the population and locations needing telecommunications-delivered educational/medical programming. Further, few communities currently have readily available, as does Reading, two-way CATV systems capabilities.

Until two-way, wired city and county CATV installations become more widely established, the national educational significance of CATV in America's structured-curriculum processes is likely to be restricted.

Satellite Circuits

In 1972, faculty members of the University of Hawaii and their Project *PEACESAT* (using NASA's ATS-1) demonstrated that satellite communications methodologies could effectively distribute two-way, audio educational information, whether structured curriculum or seminar-type discussion.

Also during 1972, a thorough technical report, prepared for a committee of the National Academy of Engineering* by Donald G. Hagg, manager of the Advanced Systems Concept Development and Research Department, U.S. Postal Service, made clear the usefulness and achievable economies of satellite circuits for the delivery of bulk quantities of information between America's 125 largest cities—

*The Advisory Committee of Issues in Educational Technology.

provided the satellite circuits were used during the night hours, when satellite traffic was anticipated to be light and tariffs, therefore, low.

Also for the same NAE Committee in 1972, I produced a report that projected the potential usefulness of satellite circuits in delivering educational and medical programming to the Appalachian, Rocky Mountain, and Alaskan areas and overseas U.S. territories.

Since 1972, few, if any, really basic and major new answers to the how, what, when, where and how much questions about the educational use of satellite have been made. For instance:

- It then could, and still can, be clearly demonstrated that most intrastate educational/medical traffic in the contiguous states can be more economically distributed by means of private microwave or common-carrier systems (especially if audio-video transmission is required) than by satellite systems. Accordingly, perhaps educators in the 48 contiguous states will find that the use of common-carrier satellite circuits on a when-needed basis will meet any satellite-circuit requirements necessary to maintain communications contact with out-of-state resource centers and expertise.
- Just what spectrum space, other than that already allocated in 4-6 and 11-13 gigahertz bands for satellite use, the FCC and the forthcoming 1979 World Radio Conference will make available for educational satellites is still not clear.
- The ability and willingness of any but federal jurisdictions to meet the continuing and staggering capital equipment and operating costs of educational satellite circuits has yet to be demonstrated.

There are, however, two proven facts about educational satellite circuits: 1) They require five to six times more frequency spectrum space than do, say, comparable earth-bound ITFS systems capable of providing the same telecommunications capabilities; and 2) Exclusive of the substantial costs of launching and maintaining a communications satellite, satellite ground equipment requires a capital equipment investment that is at least twice that of earth-bound systems with comparable capabilities.

Most educators therefore believe that educational telecommunications systems should be built from the ground up, not from the sky down.

ITFS Circuits

Although the assessments in table 2 of the generic types of available telecommunications systems are, I believe, quite accurate, when considered as a total data group, they might imply that ITFS is the only truly useful educational telecommunications technology. Such a deduction would, of course, be far from correct. As has been made clear, for certain educational and social-service purposes, other telecommunications methodologies can be just as effective and more economical. The fact remains, however, that ITFS is the only telecommunications methodology which most of those knowledgeable in telecommunications, based on their own use of media, consider critical to the intensive, comprehensive, nationwide effective use of telecommunications in educational, rehabilitative, medical, and social services operations. But, even the listing of its many unique technical capabilities and

significant educational applications does not tell the full story regarding ITFS's present and future potential significance.

Growth Rate and Expansion Potential of ITFS

During 1976, when CenTeX studied 63 of the approximately 90 ITFS operations in the United States, these operations were serving more than four million students. Extrapolating these data to the total number of ITFS operations then in the United States, it has been estimated that ITFS systems in 1976 were serving approximately 7,500,000 students.

As part of its continuing effort to keep its study of educational technology up-to-date, CenTeX reviewed federal communications records during May 1977. The results of this review are summarized in table 3.

As table 3 indicates, during the 18-month period following the initial CenTeX study, ITFS overall expansion was 18.9 percent; licensees and applicants had increased from approximately 90 to 103, and the actual number of channels in operation was 497.

Table 3. Statistics on the Current Status of ITFS, Nationwide.

Number of ITFS licenses	99
Number of channels in operation	497
Average number of channels per operation	5
Number of additional channels requested	50
Increase in number of channels	10%
Number of new applicants for systems	4
Number of channels requested	44
Average number of channels per applicant	11
Increase in number of system operators	4%
Total number of licensees and applicants	103
Total number of channels	591
Average number of channels per operation	5.8
Overall expansion of ITFS	18.9%
Number of separate licenses issued	193
Number of new licenses	39
Total number of licenses	232

Public Schools 52%	Private Schools 10%	Graduate Schools 33%	Medi- cine 5%
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Source: Data are from FCC records and are current as of May 1977.

The May 1977 review of FCC records also made clear that two services—rural-area and social-services providers—were becoming significant users of ITFS telecommunications distribution systems.

Of significance are these facts:

- In May 1977, America's ITFS systems were serving more than 7,500,000 students at all levels of education—from pre-school through senior citizen.
- The currently in-place ITFS systems are located in areas where more than 38.42 percent of America's population live. (See figure 2.) With appropriate expansion, therefore, existing ITFS operations could effectively deliver educational, rehabilitative, medical and social services programming to 78,086,745 Americans, and provide the two-way audio-video and/or audio return-circuit capabilities required to make many major phases of these four basic public services effective.

Other major factors regarding the distribution scope and power of ITFS delivery systems are discussed in the following pages.

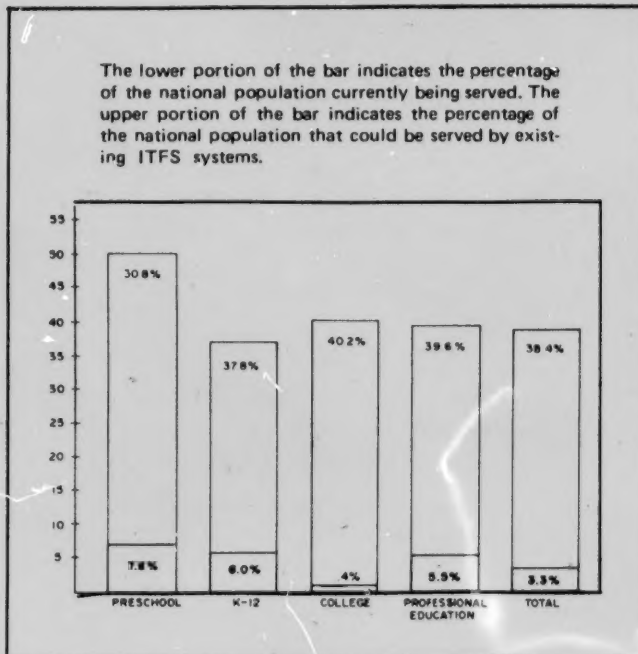


Figure 2. Service areas of current ITFS systems.

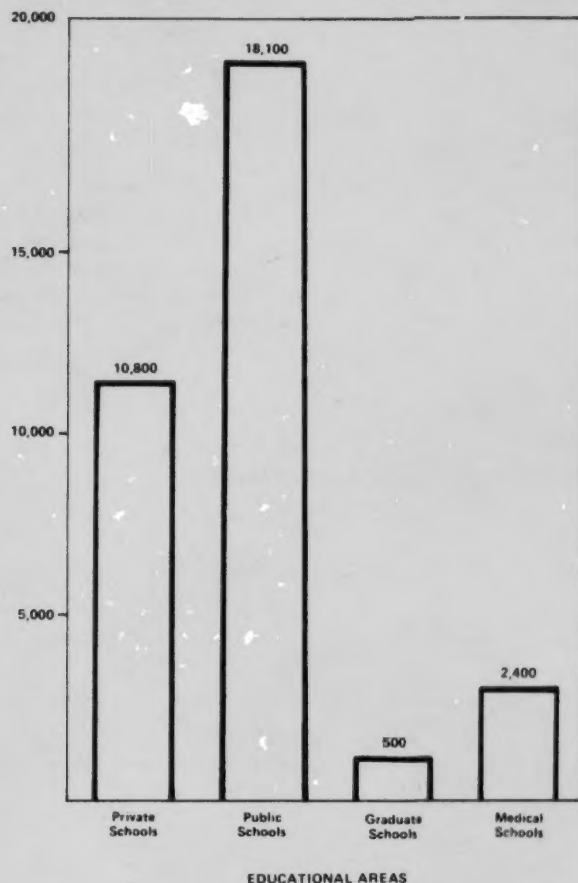


Figure 3. Per channel viewing populations.

Intensive Use of Available Channel Spectrum

It is important to note that the average viewing population of a public school channel is 18,100 pupils (see figure 3); that of a medical school channel is 2,400 "students"; that of the average private school 10,800 pupils; and that of the average graduate school channel approximately 500 students. ITFS really makes heavy-duty use of its assigned spectrum space.

Potential Application and Capacity of One ITFS Channel

As figure 4 so clearly demonstrates, because an ITFS channel is six-megahertz (six million cycles) wide, and because the FCC has not only recognized the vary-

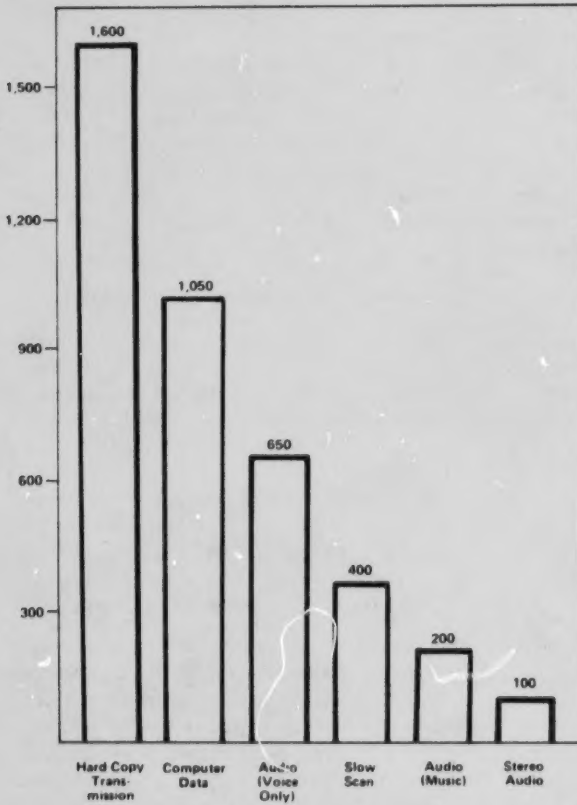


Figure 4. Potential number of circuits available per ITFS channel.

ing telecommunications needs of education but also has adopted rules that ease the use of ITFS systems to meet these needs, *one* ITFS channel can be used for many types of transmission. For instance, a channel can be used to provide transmission either for a single TV circuit or for the transmission of 400 slow-scan circuits; for 650 audio-only circuits or for 1,050 computer access and control circuits.

Multi-channel Capability of the ITFS Spectrum

Because there are 28 contiguous six-MHz channels available in the ITFS spectrum and because ITFS propagation is line-of-sight, ITFS channels (if their applications are appropriately engineered and their use limited to earth-bound systems) have sufficient capabilities and capacity to meet all currently projected nation-

wide education and health-service telecommunications delivery system needs, except for the 100 largest American cities.

Given consortium-operated telecommunications system objectives and management and the advantage of the non-competitive time requirements of the various educational/medical services, the ITFS spectrum, as currently engineered, may even be capable of meeting all of the nation's educational/medical telecommunications delivery needs except in the 50 largest cities. Progress in telecommunications componentry and system design will, it is hoped, someday make it possible for ITFS to develop the capacities needed to meet (or more nearly meet) *all* of America's future educational and health needs.

Practical, Available, Low-cost Production Techniques

Educational use of ITFS focuses on the communication of information and know-how, and it need not compete with commercial television for viewer attention. ITFS emphasis is on information transfer and interactive teaching and learning. The effectiveness of most educational programming does not depend on the slick production standards so critical to the success of general TV broadcasting.

FCC regulations for ITFS recognize this fact and permit educators to reduce the technical production standards normally required for broadcasting. This can reduce ITFS production costs by as much as 75 percent, and thus innovative services (e.g., two-way, audio/video teaching) become both feasible and effective.

Lower Capital Investment and Operating Costs

All these factors make the capital investment and operating costs of ITFS telecommunications delivery for education and medicine the lowest of any available today. For instance, an average ITFS transmitter/receiver station currently costs approximately \$100,000-\$150,000, compared to \$1,000,000-\$3,000,000 for a public television transmitting-only station or \$350,000 to \$400,000 for a comparable satellite transmitter/receiver station, plus the cost of a complementary ground network to make the use of such a system comparable to what ITFS already offers at ground level. (It is important to note that one audio/video satellite circuit costs six times the frequency spectrum of its ITFS counterpart.)

ITFS Is Cost Effective

Figure 5 shows the average per student cost of delivering education via ITFS systems to the major student bodies served by the nation's ITFS operations. It will be noted that the figures for each major student body population include capital equipment depreciation as well as total annual operating costs.

Of particular interest are the school figures. The average public and private school annual per-student cost for the type of ITFS school service described in detail in this paper is \$5.67 per year. It is to be noted that the National Center for Education Statistics in the 1976 edition of *The Condition of Education* estimates that the current per-student annual school cost averages \$1,300. In other words, *the cost of providing ITFS systems to America's schools is less than one-half of one percent of the total per pupil average annual cost of American school education.*

The cost of ITFS services for the distribution of medical education is even more infinitesimal. The annual tuition cost at some medical schools today is more

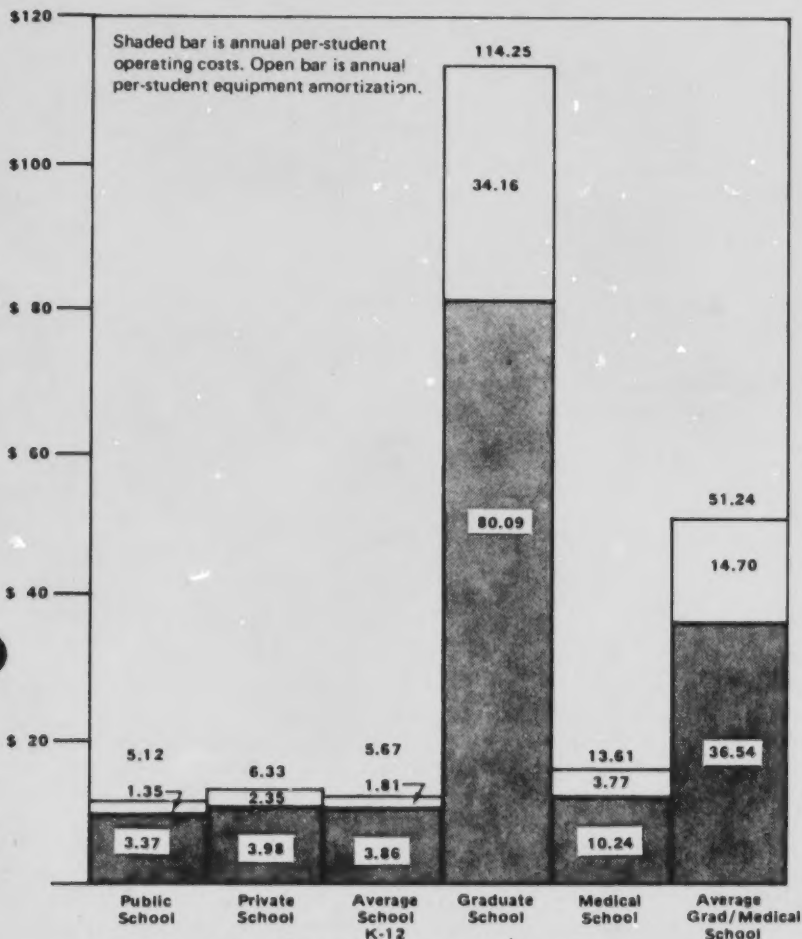


Figure 5. Annual total per-student costs.

than \$12,000. Using, however, a much lower annual tuition cost, say, \$6,000, or half that of the George Washington and Georgetown medical schools in the nation's capital, the cost of ITFS distribution (\$13.61) is less than one-quarter of one percent of the annual medical school tuition fee.

ITFS Generates Its Own Economic Viability

Today, ITFS is the only major educational telecommunications methodology generating its own operating support dollars.

How would public television and public radio survive without the regular, annual appropriation of the millions of federal and state dollars which keep such operations alive and expanding? How extensive would be the educational use of satellite circuits (although there would be some, of course) were the supporting millions of federal dollars and "free" satellite circuits not annually appropriated

by Congress? Where are the educational cable and FM-multiplexed circuits that are "carrying their own freight?"

ITFS Has Sound Operations Management

Today, ITFS educational/medical telecommunications systems have an annual expansion rate of 12.3 percent,⁵ without the infusion of funding from any federal source.

How has ITFS survived without the underwriting provided by Congress for satellite, public broadcasting, and some other esoteric federally-funded educational telecommunications systems? It survives this lack of federal support because operators of ITFS systems have learned to manage their operations so effectively in the public interest that they are getting by without annual subsidies from the federal trough. What would ITFS do for education if it were given the federal support, under the direction of qualified project officers, that its record merits?

(In the interests of accuracy, it should be noted that during the late 1960s, federal funds were made available to establish ITFS operations, and that HEW's Bureau of Education for the Handicapped, under project officers H. L. Saettler, P. A. Andereck, and M. J. Norwood, is currently providing major federal interest and support to ITFS when used for the delivery of services affecting the handicapped.)

ITFS Is a Democratic Telecommunications Methodology

Because ITFS transmission is line-of-sight and uses very low-powered, relatively simple equipment (which can be safely and easily used by non-technical personnel), and because ITFS systems are low in cost (compared with comparable public TV, satellite and CATV systems), local school, college and social-service organizations—whether publicly or privately controlled—can afford ITFS capital equipment and operating costs. Further, they are readily able to determine local needs, which is essential to the effective use of ITFS for the distribution of services to local or small regional populations.

Unlike public broadcasting, satellite stations and telephone systems, ITFS can, therefore, be used to meet precisely local scheduling and programming requirements, and can be controlled by local, private and public authorities. ITFS is the only major telecommunications technology that permits full recognition of two cardinal principles of American democracy: the *local control* of education and the *diversity* of its objectives and management. Yet, ITFS technologies—without negating the principles of local and diverse control—can effectively establish ground-based regional, state and even national telecommunications networks.

Barriers to Egalitarian Education

Without question, America has created the world's most democratically-oriented system of education. Despite egalitarian legislation, judicial actions, and ever-increasing dollar appropriations at all levels of government, however, the world's most comprehensive educational system is in dire trouble. This assessment is based on many factors, including the following:

- Many American voters believe the spiralling costs of education are unjustified by either inflation and/or increased instructional scope and quality. (Voters approved 74.7 percent of school bond issues in 1965; only 46.3 percent in 1975.⁶ And, witness the recent 2-1 passage of Proposition 13 by California's voters and similar legislation elsewhere.)
- According to figures compiled for the Advisory Committee on Issues of Educational Technology, National Academy of Engineering, the constraints of time and geography are primary reasons for the current failure of the country's educational processes to meet 50 percent of the nation's critically important educational needs.⁷
- Education is the only major American industry that fails to make major use of modern technological developments to increase the scope and distribution of education services and to increase the net productivity of its "workers" and "executives."

What are the barriers to national consideration and use of an educational tool which has demonstrated for almost a decade its effectiveness and economic viability at all levels of education?

In May of 1962, the Congress of the United States, recognizing the educational potential of television, amended its Communications Act of 1934 to provide for "Grants for Educational Television Broadcasting Facilities" (PL 87-447, 87th Congress). The adjective *broadcasting*—rather than *educational*—has been emphasized by most Presidential proclamations, and in decisions by Congress, educator study groups and state legislatures.

The Federal Communications Commission alone has continued to protect the original intent of Congress by emphasizing the significance of the word *educational* in its regulations. Therefore, when it implemented the Congressional amendment by establishing 31 channels (in the 2,500-2,690 megahertz frequency band) for educational use on July 25, 1963, it titled the spectrum area "*Instructional Television Service*," now commonly referred to as the ITFS Band.

It is important to note that the initial 1962 legislation mentioned above includes these basic qualifications regarding applicants:

(1) that the applicant is (a) . . . responsible for the supervision of public elementary or secondary education or public higher education . . . (b) the state educational television agency . . . (c) a college or university . . . (d) a non-profit foundation, corporation or association which is organized primarily to engage in or encourage educational television broadcasting.

The Congressional Conference Report establishing the May 1962 ETV Facilities Program (House Report 1609) very emphatically states:

The conferees placed the responsibility for the execution of this program in the Office of the Secretary of Health, Education, and Welfare (HEW). . . . Under no circumstances should this program be subordinated to or tied in with other Federal programs in the field of education.

The Congress initially designed this legislation to ensure that it received top, prompt attention and to emphasize that funding would go primarily to educa-

tional (not primarily to *broadcasting*) organizations. Today, not one of these basic Congressional intents is being followed.

The allocation of grant funds is in a lower-echelon group of the Office of Education, far from the top level of HEW and is made to *public* broadcasting organizations whose primary aim is to produce and distribute, over a wide geographic area, programs of general cultural and informational interest, rather than specific educational curricula.

Oddly enough, it was the educators themselves who first tore up the spikes that held the guiding "tracks" of PL 87-447, of May 1962, to the Congressional purpose.

In 1967, a commission of educators set up by the prestigious Carnegie Foundation published its report on educational TV.⁸ This report primarily concerns general public broadcasting, which it analyzes in depth. At its very end, beginning on page 237, the report devotes less than a page to Instructional Television Fixed Service. The remaining 254 pages emphasize that "non-commercial educational television stations may transmit educational, cultural and entertainment programs," with little reference to the use of technology for formalized, prescribed, educational instruction for students.

This Carnegie report and millions of Ford Foundation dollars led to the enactment by Congress of PL 90-129, in November of 1967, which established the Corporation for Public Broadcasting. As its name implies, this organization (with its operational associate, the Public Broadcasting Service) is solely concerned with promoting public broadcasting, and its federally-funded Congressional liaison organizations aggressively and exclusively protect the line of federal funding for their public broadcasting membership. During the current fiscal year, for instance, appropriations will provide more than \$42 million worth of federal subsidies for public broadcasting stations, and forecasters believe that Congressional appropriations for public broadcasting will soon exceed \$100 million per year.

Further, the technically knowledgeable National Science Foundation has spent more than \$10 million of the taxpayers' money in recent years to develop costly, esoteric educational telecommunications prototypes, such as those of projects Ticcit and Plato (which would be equally costly to replicate), but it has refused to supply comparable funding levels for the support of ITFS system research and development.

Even HEW's National Institute of Education, which is specifically charged by the Congress with responsibility for educational innovation, appears to prefer spending dollars for spectacular satellite experiments rather than for developing practical telecommunications delivery systems. The satellite experiments are designed to serve approximately 15.1 percent of the nation's population, whereas practical telecommunications delivery systems are capable of serving approximately 84.99 percent of the population, while costing much less in scarce spectrum space and citizen tax dollars.

Fortunately, despite lack of federal encouragement, ITFS is far from dead. Fortunately, too, one federal agency—the Bureau of Education for the Handicapped (Personnel Preparation and Media Services Divisions) has kept ITFS applications research and demonstration alive by funding the world's first use of ITFS to serve specifically the educational needs of handicapped children.

How to Put Educational Technology on the Right Track

Some major decisions and actions will be required at all levels of education and pertinent jurisdictional leadership before educational technology can be put back on track and headed in the right direction. The required steps can be plotted in a step-by-step procedure.

Step One

The first step in getting educational telecommunications back on the track is the establishment of an accurate general understanding among pertinent educators and government officials of the educational telecommunications technologies available and of the potential use and economic factors pertinent to their respective application to one or more components of America's educational processes.

This educational and information objective is a basic requirement for all jurisdictional levels—federal, state and local—affecting educational legislation and operations. Unless this is done, educational legislation and funding will be the result of special group pressures, rather than national interests.

Step Two

The second program step concerns breaking the educational telecommunications monopolies which exist at the national and many state levels.

Current federal funding legislation, for instance, limits the pass-through process of federal educational broadcasting dollars solely to public broadcasting stations. *It is neither in the interest of the nation's democratic future nor in the immediate public interest to limit all federal educational telecommunications funding to a single monopoly controlled by broadcasters, not by educators.*

Federal legislation is needed as soon as possible to preclude vested-interest control of educational telecommunications and to recognize and clearly establish an equal status for both "educational TV," as public broadcasting is called, and *instructional television*, such as ITFS.

Otherwise, a federally maintained CPB and PBS will not only destroy the only self-sustaining telecommunications operation—ITFS—in the educational telecommunications field, but will create the type of monopoly capable of destroying America's hope for a truly egalitarian educational system.

Step Three

It is most important that federal and state funding dollars for educational telecommunications be placed in the custody of those who are most directly accountable for the use of those dollars.

For instance, funding dollars which are now placed by the National Institute for Education and the National Science Foundation would probably be more carefully and productively used if they were spent by the Office of the Commissioner of Education. Further, the transfer to a single funding source could substantially reduce the amount of currently required overhead dollars.

Step Four

ITFS operators should form a professional society to organize their experience, so that the experience of one member can be promptly made available to other society members, and so that educators, legislators and others needing information regarding the use of ITFS can have an authoritative source from which to secure it.

All other major suppliers of educational supplies and services (cable and public television operators, textbook and audiovisual equipment manufacturers) have such organizations, but ITFS has not had one since the FCC's National Committee for the Full Development of the Instructional Television Fixed Service was abolished approximately four years ago.

Conclusion

In the end, what happens to ITFS will depend on actions taken by the Federal Communications Commission.

Currently, some commercial interests would like to use ITFS for the distribution of pay television programs. At least one manufacturer wants to usurp two 30-megahertz segments of the ITFS spectrum plus guard spectrum (or 36-47 percent of the entire ITFS spectrum) to establish a commercial, limited common-carrier system, under the guise, of course, of a social service for-profit operation!

Even non-profit operations (such as some would-be satellite users and operators) would like to secure for special interest uses portions of the valuable ITFS educational spectrum.

The FCC must be persuaded to resist these attacks on our most valuable educational spectrum resource. The 1971 decision to reserve the ITFS spectrum for non-profit educational use, considered by many to be the most statesmanlike action ever taken by an American regulatory commission in the public interest, was by a bare majority of four to three. Since the composition of the Commission has changed substantially since 1971 (only one of the Commissioners who voted for the establishment of the service is still on the Commission), and since the commercial and other interests trying to secure the spectrum space are served by professional lobbyists, a vigorous and concerted effort must be made on behalf of ITFS.

If the FCC refuses to reduce the ITFS frequency allocation, and if the actions outlined in steps one through four are taken, ITFS will soon take its rightful place at the forefront of America's educational, medical and social service delivery processes.

REFERENCES

1. *ITFS* (Instructional Television Fixed Service), published by the National Academy of Engineering under the auspices of a Committee established in October 1965 at the request of the FCC.
2. *Ibid.*
3. Detailed reports of the major findings of two CenTeX ITFS studies have been published. See Curtis, J. A., and Alan R. Blatecky, "Project TIMES—Telecommunications in Medical and Educational Services," *Educational & Industrial Television*, April 1977, pp. 35-42, and Curtis and Blatecky, "The Economics of ITFS Use," *E&IT* April 1978, pp. 47-58. Much of the data in this paper has also appeared in those articles.
4. Association of Radio Reading Services for the Blind and Handicapped, Engineering Workshop, Annual Meeting, St. Louis, Mo., April 17, 1978.
5. Curtis and Blatecky, *op. cit.*, 1977 and 1978.
6. *Ibid.*
7. *Ibid.*
8. Carnegie Commission on Educational Television, *Public Television: A Program for Action*, Harper and Row, N.Y., 1967.

Cable Television: A Useful Tool for the Delivery of Education and Social Services?

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Community Antenna Television (CATV) was first established in 1949 in remote areas of Pennsylvania and Oregon.* The concept was a simple one: Television signals could be provided in areas of poor reception by using an antenna sufficiently high to receive a remote broadcast signal, and then redistributing the signal via coaxial cable to subscribers who could not otherwise receive a good signal on home-type antennae. For this service, subscribers were willing to pay a fee. An entire community could thus be served from one master antenna, leading to the FCC designation of the service as "Community Antenna Television."

CATV's Early Childhood: A Period of Robust Growth (1950-1960)

CATV's birth-and-growth pattern has been exactly the reverse of almost every other American technological innovation, including that of the broadcast industry that spawned it. Cable television began in remote rural areas, expanded into the suburbs and is now beginning to penetrate large urban areas. Most major electrical and electronic developments—from the electric light and telephone to radio and TV—have begun in heavily populated areas and then spread outward into the countryside.

By 1952 (the first year for which *TV Factbook* reports CATV statistics) there were 70 operating CATV systems serving 14,000 subscribers. During each of the next two years, both the number of systems and the number of subscribers more than doubled: 150 systems served 30,000 subscribers in 1953, and

*While documentation of the "first" CATV system is a matter of debate, it is generally agreed that parallel developments in Oregon and Pennsylvania led to operating CATV systems in both areas during this time period. (See Mary Alic Mayer Phillips, *CATV: A History of Community Antenna Television*, Northwestern University Press, Evanston, Illinois, 1972.)

300 systems served 65,000 subscribers in 1954. By 1958, ten years after the first systems were established, there were 525 systems serving 450,000 subscribers (see table 1).

Table 1. Growth of the CATV Industry.
(as of January 1 of each year)

Year	Operating Systems	Total Subscribers
1952	70	14,000
1953	150	30,000
1954	300	65,000
1955	400	150,000
1956	450	300,000
1957	500	350,000
1958	525	450,000
1959	560	550,000
1960	640	650,000
1961	700	725,000
1962	800	850,000
1963	1,000	950,000
1964	1,200	1,085,000
1965	1,325	1,275,000
1966	1,570	1,575,000
1967	1,770	2,100,000
1968	2,000	2,800,000
1969	2,260	3,600,000
1970	2,490	4,500,000
1971	2,639	5,500,000
1972	2,841	6,000,000
1973	2,991	7,300,000
1974	3,158	8,700,000
1975	3,506	9,800,000
1976	3,651	10,800,000
1977	3,801E	11,900,000E

E=estimated

Source: *TV Factbook*, 1977

Note: The change in the number of systems operating each year is determined by three factors: 1) new systems which began operation during the year; 2) older systems coming to the attention of the *Television Factbook* for the first time and therefore included in the total for the first time; 3) The splitting or combining of systems by operators.

Most of these early systems were small rural ones, which retransmitted commercial broadcast signals of only a few (one to three) stations, and until 1953, technical capacity limited cable transmission to no more than five television channels. By 1953, however, 12-channel cable capacity—the channel capacity of a standard television receiver of that time—became a reality, and cable seemed ready to take on its city-born cousin—commercial TV.

CATV's Youthful Period: New Responsibilities

With adolescence there usually come "rules of conduct." During CATV's early days, such rules were primarily developed on the local level and usually took the form of jurisdictional franchise agreements granting permission to run cable over public property, and establishing payment scales for this right, usually a percentage of gross profits.

By the 1960s, however, two developments radically altered the CATV picture:

- 1) Cable operators began to make serious efforts to originate local programming. Although some system operators had been experimenting with local origination, such origination had until the 1960s been an exceptional rather than normal operating procedure.
- 2) Cable operators began to use microwave technology to import signals from television stations too distant to be picked up over the air. This development was significant in two respects.

First, the long-distance, multi-program importation created CATV's first real threat of competition to the local broadcaster. Until this threat, big-city commercial station operators had been only too happy to have their service areas extended by cable systems.

Second, since the operation of microwave transmitters requires Federal Communications Commission licenses, the Commission—which up to this point had been reluctant to impose regulation on cable systems—now had a responsibility to do so. FCC regulation of the CATV industry, once it began, continued to increase in scope and severity.

In 1962, the Commission began to impose case-by-case restrictions on those CATV systems using microwave relays and, by 1966, the FCC asserted its jurisdiction over all cable systems, including those not using microwave relays.¹ By 1966, FCC rules even mandated the carriage of local signals and imposed procedures for the importation of distant signals into the top TV markets.*

*The FCC claimed these regulations were designed primarily to protect the fledgling UHF station operators, who might be the first to be hurt by the importation of distant signals.

CATV's Adulthood

For the next several years, there was concerted effort to develop comprehensive regulations for CATV through a series of proposed rule-making hearings, which invited comments from all concerned parties. Prompted by the President's Office of Telecommunications Policy (OTP) insistence that a workable pattern of cable regulation be developed, comprehensive rule-making was completed by the Commission in 1972.

Briefly, the 1972 rules included the following:

Authorization

In order to begin operations, a cable system must obtain a certificate of compliance (CAC) from the FCC. Granting of the CAC is contingent upon the cable operator having first obtained a franchise from the appropriate local authority. Broad guidelines were provided for use by local governments, but local governments are allowed considerable latitude with regard to such details as fees, terms of agreement, geographic areas of franchises and subscriber rates.

Signal Carriage

- 1) Cable systems *must* carry all local stations licensed to communities within 35 miles of the served community.
- 2) In addition, cable systems can, if they so choose, import distant signals to provide, in conjunction with the "must-carries," a total of:
 - a) Three network and three independent stations in the top 50 markets;
 - b) Three network and two independent stations in the next 50 markets; and
 - c) Three network and one independent stations in markets smaller than the top 100 markets.

Stations within the top 50 markets may import two distant signals, even if local "must-carries" fill the allowable quota.

Protection of Local Broadcast Interests

- 1) Network programs imported from a station must be blacked out if the program is carried simultaneously by the local network affiliate.
- 2) In the top 50 markets, syndicated programming may not be shown on cable for one year from the date that it is first sold anywhere in the country, nor for as long as it is under contract to a local station. (The next 50 markets are subject to similar though less restrictive regulations.)

System Requirements

- 1) All new systems with 3,500 or more subscribers in major markets (all new systems regardless of market size since 1977) are required to have *20-channel capacity* and *two-way capability*. Older systems with 3,500 or more subscribers must meet these standards by 1981.
- 2) Systems with 3,500 or more subscribers must also provide four access-channels (for local, educational, public and leased use) if system capacity

permits and demand exists. Systems with insufficient channel capacity must make at least one channel available for the four previously listed uses combined. Systems must also make equipment available for local production.²

More Recent Regulatory Restrictions

Subsequently enacted FCC rules were made to protect feature films and sporting events from "siphoning" by pay cable. On March 25, 1977, however, the U.S. Court of Appeals for the District of Columbia (which is the court of original jurisdiction in FCC matters) struck down these regulations in *Home Box Office vs. F.C.C.*, finding that 1) the FCC had no evidence showing them that pay cable would adversely affect the public interest; 2) the rules violated the First Amendment; and 3) they were issued without statutory authority. The Supreme Court declined to hear the case on appeal by the FCC, thus allowing the court's opinion to stand.

But the 1972 FCC rule-making still stands, and the latest federal copyright legislation puts further mature and reasonable restrictions on the unrestricted CATV use of programming material owned by others.

Continuing, but Less Dramatic, Growth

Within this regulatory framework (and, many feel, in spite of it), cable television has continued to grow. During the period from January 1972 to September 1976, for instance, the number of cable systems grew from 2,770 to 3,715, an increase of 34 percent. During the same time period, the number of subscribers grew from 6,000,000 to an estimated 11,500,000, an increase of 91.7 percent.³

Though America's CATV industry is today a sizable operation, the 30-year-old fledgling has yet to become the mighty and comprehensive giant once predicted. For instance, in 1971 the Sloan Commission on Cable Communications predicted that CATV would have penetrated 40-60 percent of the national market by 1980.⁴ Today, its penetration is believed to be approximately 17 percent.⁵

A recent CenTeX study includes data regarding the nation's 15 largest CATV operations (as of September 1, 1976, as reported by the 1977 *Television Factbook*). These data indicate that America's 15 largest CATV systems have obtained an average market penetration of 23 percent in the operating areas in which they are franchised* (see table 2).

*The cable industry statisticians prefer to use a more flattering "saturation" percentage, which is the ratio of cable subscribers to the number of homes passed by its cable. This figure ignores the homes in the uncabled portions of the system's geographic franchise area and does not, therefore, reflect the true market penetration with regard to the total population that the system is franchised to serve. CenTeX thus sought to determine the true market penetration based on the total population of the franchised areas.

Table 2. CATV Market Penetration Analysis.

Rank	Location	Subscribers ¹	Households ²	% Served
1	San Diego, CA	116,012	330,531	35.1
2/10 ³	New York, NY	133,556	513,078	26.0
3	Los Angeles, CA	78,899	1,067,789	7.4
4	Oyster Bay, NY	65,000	341,517	19.0
5	Suffolk County, NY	64,749	374,983	17.3
6	San Jose, CA	61,500	171,643	35.8
7	Allentown, PA	58,300	276,139	21.1
8	Northampton, PA	55,000	112,150	49.0
9	Austin, TX	54,300	98,505	55.1
11	Wilmington, DE	42,000	63,510	66.1
12	Toledo, OH	42,000	162,574	25.8
13	San Francisco, CA	41,991	238,558	17.6
14	San Rafael, CA	40,175	68,679	58.5
15	Santa Barbara, CA	39,333	54,692	71.9
	Total	892,815	3,874,348	23.0

¹As of September 1, 1976, as reported in the 1977 *Television Factbook*.

²Based on franchise area data supplied by the FCC and population data from the 1970 census.

³Two systems serve Manhattan. Data from both systems have been combined for this analysis.

But table 2 also would appear to indicate the following:

- CATV's market penetration in large city areas, where commercial TV broadcasting stations are highly active, is still low (Los Angeles, 7.4%; New York City, 26%; San Francisco, 17.6%).
- In cities where coverage by the commercial TV broadcasting operators is less energetic, where local program initiation is less active, CATV's market penetration appears to go up (in California: San Diego, 35.1%; San Jose, 35.8%).
- In city areas quite distant from areas of locally-targeted commercial broadcast activity and where local CATV programming is high, CATV market penetration is impressive (Wilmington, Del., 55.1%; Santa Barbara, Calif., 71.9%). In distant cities where terrain permits reasonably good local use of other-city signals, however, market penetration drops (Allentown, Pa., 21.1%; Toledo, Ohio, 25.8%).
- In suburban areas well-served by large commercial TV broadcasting systems, CATV finds market penetration difficult (Oyster Bay, N.Y. and environs, 19.0%; Suffolk County, N.Y., 17.3%).

- In city and county areas, outside the range of big-city TV broadcasting systems, CATV has, from its inception, done well (Northampton, Pa., 49%; San Rafael, Calif., 58.5%).

In brief, the CATV industry has, during the 1970s, continued to penetrate well the rural, county and city areas away from the areas saturated by commercial TV broadcasting services; but it has not become the dynamic social force and communications system giant once predicted by its proponents. Neither has it become the money-making "machine" once envisioned.

CATV's Maturity: The 1980s

The questions now facing the CATV investor—be it the investment of dollars, time, energy, or expertise—are these:

- 1) Can CATV penetrate America's major urban and nearby suburban markets on an economically viable basis?
- 2) What are the tools available to accomplish the penetration of these heavy-population-density areas?

Before considering data which may possibly provide answers to these two fundamental questions, the following facts should be noted:

- Some 3,700 "ordinary" cable systems are today serving more than 8,000 communities and more than 12,500,000 subscribers, who are, in most instances, located in far-from-big-city rural, suburban and urban areas.⁶
- The cost of installing cable on existing poles in rural and suburban areas is reported to average \$6,000 per mile; the per-mile cost of underground installations in densely populated areas, \$80,000.⁷
- Today, both the federal government and private industry are investing heavily in the development of new technical and programming tools to facilitate CATV's big-city market penetration ambitions.

All of these efforts combine two basic strategies: The development of *locally* unique programs and services not today obtainable from commercial and public broadcasting stations; and individual program participation methodologies designed to encourage and enable CATV subscriber participation in locally unique programming (whether TV games or educational course ware).

Typical examples of the current, new-tool developments which may give CATV the necessary marked impact to compete effectively in big-city and near-big-city areas with commercial and public broadcasting services are discussed below.

Warner's Qube System

One prototype system, which the entire industry is watching with more than a casual interest, is Warner Communication's Qube system in Columbus, Ohio. Qube is a 30-channel, interactive system. A small computer terminal in the subscriber's home permits the subscriber to participate in programs—take tests, vote

on public issues, and even to have home fire-and-security protection. The computerized set-up will also make possible the transmission of specific programming exclusively to pre-selected subscribers ("narrowcasting").

The Qube system, which started full operation in December 1977, also provides three educational channels (one pay and two free) and a local production origination channel.

Qube's home-located "black box" control unit provides five different response buttons for viewer program participation. This capability enables the subscriber to take multiple choice examinations, to respond to public-opinion polls, and even to request information or order merchandise.

One of the premium (pay) channels will feature continuing education, enrichment and hobby/how-to courses under the "Better Living" heading. A free educational channel is "Qube Campus," featuring courses offered for credit by three local universities in a variety of formats. The second free educational channel, called "Culture and Learning," will carry a variety of cultural, informational and educational programming, including captioned materials for the hearing impaired, some "narrowcast" specifically to that population.

The local live channel, "Columbus Alive!," offers a variety of programming with heavy emphasis on viewer participation—talk shows, quiz and game shows, sports, interviews and "happenings."

Obviously, Warner has invested a lot of its dollars and prestige in Qube. The company openly states that its investment is more than 12 million dollars, but justifies this substantial sum on the belief that Qube will not only test subscriber reaction to a comprehensive interactive cable communications system, but that the Columbus experience will provide an indication of how other urban areas (the "last frontier" of cable) might react to and support such systems.

W. Spencer Harrison, Warner's executive vice-president, has stated, for instance (as quoted by the *New York Times*): "If it [Qube] works, urban cable television will become a reality. If it fails, cable in the large cities may be a dead issue for many years."

Mr. Harrison may, indeed, be accurate in his observations. Though the prospect of customers accumulating charges at the rate of \$1.00 to \$3.50 per program (the range of the Qube system) is bound to make huge system investments look less formidable than the average fee of \$7.87 charged for pay channels, such as those of Home Box Office, the question becomes this: To what extent over a period of time is the consumer likely to use and pay for special programs designed to serve his unfilled, desired, but perhaps economically impractical, needs? Are there enough unfilled needs to support the huge initial Qube-type investments? Warner's management obviously believes the answer to such questions is yes.

CATV's Educational Service Potential

One of the traditional strengths of the American educational system (and, it might be argued, of American democracy itself) has been the *local control of education*. Cable television is especially well-suited to serving local educational

needs. Cable systems are usually locally operated, even if not locally owned; they usually follow jurisdictional boundaries (because of franchising procedures); they have more potentially available spectrum space than commercial or public broadcast television, and they can be made available inexpensively to potential educational users, including people in their homes as well as students in schools or universities.

Why has this potential not been exploited more widely? Again, there are multiple factors working in combination.

In the first place, an educational entity has to decide that television can help to meet its educational objectives (assuming that the objectives have been defined). This is no small hurdle, especially since the educational use of television has a less than perfect track record, and there will always be those who mistrust technology in any form. Second, there must be a fairly substantial initial commitment of funds to the endeavor.

For those who are willing to take the trouble, however, the results from the use of CATV circuits for the distribution of educational programs can be rewarding. A case history may help to illustrate both the problem and the rewards.

A Case History—Shawnee Mission

In 1969, the Shawnee Mission Public Schools (SMPS) in suburban Kansas City, Kansas, began operation as a unified school district serving ten municipalities in Johnson County.* One of the school districts consolidated had a closed-circuit system serving six schools, which was operated for one additional year by the unified system. In the meantime, a study of various telecommunications options for a district-wide system was undertaken. The options were ITFS, district-owned cable and leased cable. All, however, were beyond the financial means of the district.

About the time that the whole idea was about to be abandoned, TeleCable (a Landmark Communications cable subsidiary) was granted a cable franchise for nearby Overland Park. Included in the franchise agreement was one channel for educational access and the option to lease up to three more channels. TeleCable has subsequently obtained franchises in all but one of the municipalities comprising the Shawnee Mission district. One of the municipalities specified the provision of two educational access channels in the franchise agreement. Since the same cable system serves all nine municipalities, this meant two channels for the entire district.

The regular programming of one channel began during the 1972-73 school year, and two-channel operation came in the next year. Thus, three years elapsed between the feasibility study and the beginning of programming.

Originally, programming was fed upstream to the cable head-end, which is located in the next county, closer to the expected geographic center of the eventual cable service area. The distance the signal had to travel (through 31 amplifiers) resulted in significant signal deterioration. A decision was therefore made to originate from the cable head-end itself, using video cassettes. While this effectively eliminated live programming, its loss was considered acceptable in light of the improved signal quality gained by originating from the head-end.

*All data on Shawnee Mission Public Schools were developed from personal interviews with SMPS staff, January 9-10, 1978.

One experiment conducted while live programming was still possible was the two-way interactive use of the system for two homebound students. While this experiment has been reported as successful in some cable literature, it is the opinion of the system's chief engineer that they "never really got the [two-way technical]bugs out of the [cable]system."

Shawnee Mission originally produced about 50 percent of its own programming, but as high-quality programming has become more available from others, this figure has decreased over the years to a current 20 percent. In addition to pre-recorded TV programs, Shawnee Mission also purchases videotape rights to 16-mm films, so that all cable origination can be done on video cassette, thus eliminating the need for a film chain at the cable head-end, where space is at a premium. Programs are typically repeated several times at various hours and on different days to permit maximum scheduling flexibility by individual teachers for their specific student populations. In addition, open time is made available to distribute material requested by individual teachers.

Of the 64 schools in the district, all but two are served by the cable system. One is in a municipality without a cable franchise; the other in a municipality that is franchised, but that has a school in the area to which cable has not yet been extended. (These two schools are currently being served by "bicycling" the cassettes to meet these schools' needs.)

In addition to the Shawnee Mission schools' daytime use of the two educational channels, the channels are used during the evening and weekend by Johnson County Community College. JCCC's programming is largely non-credit and community-oriented, and is targeted for the general population.

The Shawnee Mission experience is a good example of how a school district institutes cable use. It is also illustrative of what is necessary to operate a high-quality educational program distribution system. It is estimated that the equivalent of seven-and-one-half full-time employees (spread among the 14 full-time and eight part-time staff of Shawnee's Educational Media Services operation) are required for the cable operation. In addition to the annual personnel expense of approximately \$91,000, more than \$30,000 is spent annually on program acquisition—tape and film rental or purchase.

From a cost-effectiveness viewpoint, the following is important to note:

- 1) CenTeX's analysis of SMPS-supplied cost data indicates annual per-pupil cost of \$4.40 (which includes all personnel and material costs as well as 10-year-based amortization of all capital equipment investments.)
- 2) The \$4.40 Shawnee Mission figure compares with \$5.12, the comparable figure (from a recent CenTeX survey) for the national cross-section of the public school system using ITFS systems for the distribution of teaching expertise and materials. However, the ITFS systems surveyed: (a) can use *four* channels rather than the *two* channels of the Shawnee Mission system; (b) can distribute live, real-time programming, as well as recorded programming, and therefore can provide for interaction (either video and audio or audio-only) between instructors or resource persons and the student viewers; and (c) are privacy-protected, a feature important to most educators using telecommunications delivery systems.

But the important point is this: given two or more channels and a fully cable-reached school system with 37,000 or more students, CATV is the school level of education is cost-effective.

The Delivery of Social Services

In 1974, the National Science Foundation (NSF) awarded seven grants for the design of experiments to deliver social services via interactive cable television. The grantees were consortia, each consisting of a research organization, local government agencies and a cable system. The experiments proposed by three of these consortia were ultimately funded for implementation. These experiments have only recently been concluded—thus only some preliminary data are available. But even these preliminary findings have important implications for the future of cable as a social services/educational delivery methodology.

The Reading, Pennsylvania, Experiment

One experiment investigated the effect of two-way cable television on senior citizens' knowledge of available social programs, services and benefits, and on their knowledge of and participation in community political and social processes. New York University conducted this research in Reading, Pennsylvania, in cooperation with the ATC-Berks Cable TV Company, the City of Reading, the Berks County Senior Citizen's Council and the Reading Housing Authority.

Three neighborhood centers, one in a multi-purpose center and two in senior citizen housing projects, were linked via interactive cable. The offices of the major city council members and other public officials were regularly connected to this interactive system, and several local schools and nursing homes participated on a rotating basis.

Although the original design called for limited home viewing by 117 senior citizens by means of converters, initial response was so favorable that the programs were aired over a regular cable channel so that all subscribers could view the programs and participate via telephone.

Over a 15-month period there were more than 450 hours of interactive programming covering a broad range of subjects of interest to the elderly—from talks with the mayor and city council members and information on preparing wills to self-entertainment by group singing and peer-group counseling. More than 70 agencies participated in the programming, 20 of which later became regular users of the system. Social service agencies provided 49 percent of the programming, local government 21 percent, and educational institutions 15 percent.⁸

Much of the success of the Reading Program is attributed to these facts:

- The pertinent consumers were involved at every level from program conception to production.
- The local system was therefore used to meet local needs on a regular and continuing basis, with the result that there was both increased awareness and increased participation on the part of the local senior citizens.

Perhaps the greatest evidence of the success of the program is not in the pile of statistics amassed, but in the fact that a local non-profit organization was created to continue operation of the system at the end of the experimental phase—funded by private, industrial and government contributions. Programming has expanded into the evening hours, and subscribers in the Kutztown cable system, some 30 miles away, now participate through a microwave interconnect. A local

branch of the Pennsylvania State University is now using the interactive system to conduct adult education courses for college credit.⁹

The Rockford, Illinois, Project

In Rockford, Illinois, a consortium involving the City of Rockford, the Department of Telecommunications of Michigan State University and Rockford Cablevision used interactive cable to deliver training in pre-fire planning to city fire fighters.

The 210 firefighters were divided into four groups participating in different experimental treatments:

- 1) Two-way individual (each fire fighter with his own terminal);
- 2) Two-way group (one terminal per station, with group consensus response entered);
- 3) One-way paper-and-pencil (at the point where interactive groups would respond, fire fighters in this group marked an answer sheet, which was mailed; and
- 4) One-way, no response (these groups simply watched the tapes, serving as the control group).

All groups took a 27-item pre-test transmitted via cable, with conventional paper-and-pencil answer sheets. Then the two-way groups were familiarized with the response terminals (modified cable converters) through a series of video games generated by the system computer at the cable head-end. These games and fire trivia quizzes were continued throughout the experiment to maintain interest. Of the original 210,193 fire fighters, 92 percent completed the course.¹⁰

Preliminary analysis of results indicates that, as expected, the interactive groups fared better on the post-test than the control group. The group that used paper-and-pencil response scored almost as well as the two computer-interactive groups. There were no significant differences in the performance of the individual and group terminal groups, but the "satisfaction" quotient of the individual terminal group was significantly higher.¹¹

As in the case of the Reading experiment, the Rockford system has, according to local users, proved worthy of continuation. Currently, teachers at 14 Rockford schools are participating in interactive, inservice training, as are nurses in three Rockford hospitals.

The Spartanburg, South Carolina, Experiment

Another NSF-funded project involved three experimental programs conducted by the Rand Corporation using the TeleCable system in Spartanburg, South Carolina. These experiments were designed by Rand to test three modes of delivery/interaction:

- 1) Outbound voice and video with data return;
- 2) Outbound voice and video with voice return; and
- 3) Multi-point interactive video.

The data return interaction was applied to adult education offered by Spartanburg Technical College to prepare students for the General Equivalency Development (high school equivalency) examinations.

The home terminals used in the course operated in two modes. In the first mode, students could answer multiple choice questions; in the second, they could indicate that they would like the teacher to review the last point, move on to new material or send other limited messages. The responses were transmitted to the teacher in the cable studio and were also compiled and printed out in hard copy for the teacher at the end of each class.

Post-test data did not reject the hypothesis that cable instruction is no worse than conventional face-to-face instruction. In fact, the cable group made slightly more gain in every area except spelling.¹² Despite the limited nature of the interaction, there may be a number of educational applications where this methodology can be useful.

Multi-point video was tested in the context of inservice training of personnel at daycare centers. A series of workshops was conducted both from the cable studio and from daycare center sites, each of which was capable of origination of both video and audio. A second group of daycare centers received the programs, but were not interactive in any form. A third group, outside the cable area, served as the control group.

Of the three groups, the group that watched the programs but did not interact showed the greatest gain (gains were limited in all groups due to unexpectedly high pre-test scores). This might indicate that the presence of cameras and microphones for interaction worked to the detriment of the interactive group, since many participants found cameras distracting and felt that the ability to ask questions via audio alone would have been sufficient.¹³

If some video interaction is desirable from the viewer's standpoint, but not necessarily from the standpoint of the video-interactive participants, video interaction from a limited number of points, perhaps in rotation, might be appropriate, with audio interaction from other points. This method has the added advantage of producing an interesting, yet *inexpensive* program.¹⁴ This is also being confirmed by a Rand Senior Citizen programming project in Spartanburg, which is similar to the Reading experiment.

Voice-only return was tested in a parent education course dealing with child development. Unfortunately, the program's efficiency was not tested against video and audio return, but only against telephone return, coupled with limited data transmission (which occurred infrequently). The results of this experiment therefore could not be expected to show any significant difference in the results of the two systems, and, in fact, did not.

These NSF-funded projects were only a few of many submitted, and those submitted represented only the tip of the educational/social service iceberg. But as each new idea is tried, the knowledge about cable and its usefulness increases.

Technological Developments and CATV's Future

Two factors that may hold long-range promise for cable are fiber optics and low-cost digital processing equipment. Fiber optics uses a fine glass fiber to trans-

mit a beam of light that has a channel capacity much greater than that of coaxial cable. In addition to being smaller, lighter and more flexible than coaxial trunk cable, it has less inherent signal loss and is not subject to interference from outside electrical signals. Fiber optics may well make two-way audio-video cable circuits technically comparable in quality and cost to over-the-air, two-way, audio-video circuits.

Low-cost digital processing equipment—which has drastically reduced the cost and increased the capability of the pocket calculator and which made possible an almost endless variety of living room video games—may make feasible the more sophisticated home terminals for consumer interactive use of cable. The feeding of digital information upstream has proved valuable and workable, whereas upstream video—especially color—has proved troublesome and of dubious benefit in all but highly specialized applications. (The telephone company has also learned this lesson. That's why the Picture-Phone, which has been a technical reality for some years, is not yet sufficiently *useful* to induce customers to buy its service even in test areas. Yet, a brisk business in equipment has developed to feed digital information via the telephone for facsimile transmission and computer data input or access.)

CATV Regulation: Still Wide Open

It seems universally agreed that the real future of cable is as a broadband communications network. There is some divergence of opinion, however, as to how the ultimate system should be structured. Some operators, for instance, argue that cable operators should be considered a common carrier, and note that such classification would separate the current programming and distribution functions of cable's basic service potential. In its response to an Option Paper on Cable Television by the staff of the House Subcommittee on Communications, the National Cable Television Association (NCTA) had this to say with regard to common carrier status:

At the same time as deregulation eliminates cable's status as "ancillary to broadcasting", it would be contrary to the public interest to impose, now or at a future date, a new regulatory status—common carrier—through the separations [sic] of cable programming and ownership of facilities . . . [efforts] to maximize program offerings and eliminate developmental lag of cable technology will be thwarted by common carrier status.¹⁵

Nor, says NCTA, should the telephone companies be allowed to become the monopolistic "one-wire" purveyor of communications services. Competition creates incentives for building new facilities and would reduce Ma Bell's historical reluctance to make wholesale changes where equipment obsolescence has been a factor.

For obvious self-interest reasons, NCTA supports a Congressional subcommittee recommendation to provide a period of cable deregulation to allow a marketplace determination of the need or lack of need for federal regulation. (NCTA would like to see a specific prohibition against non-federal—i.e., state and local—regulation for the same period, or at least limited regulation within Congressionally established guidelines.)

Effects of CATV's Philosophy of Regulation

CATV's "regulate everybody else but me" philosophy may boomerang against the industry.

America has, since enactment of its anti-trust laws during the early 1900s, been quite suspicious of monopolistic controls of its communications and broadcasting services. Though on the surface CATV appears to be a highly fragmented industry, actually America's top 10 CATV operators already control more than one-third of the industry (see table 3). Thus, a decision by relatively few operators could significantly affect the entire industry. Such a situation does not encourage further deregulation at either local, state or federal levels.* Further, the original FCC rule-making process clearly warned that the FCC reserved the right to make common-carrier use of CATV circuits a matter of future deliberation and perhaps rule-making.

Table 3.
The 20 Largest U.S. Multiple System CATV Operators.

Operator	Subscribers	Operator	Subscribers
1. Teleprompter	1,084,193	11. UA-Columbia	182,000
2. Warner Cable	550,000	12. Service Electric	139,000
3. Community Tele-Communications	539,000	13. Midwest Video	134,020
4. American TV & Communications	500,000	14. New Channels Corporation	129,833
5. Cox Cable Communications	354,490	15. Continental Cablevision	128,900
6. Viacom	304,000	16. TeleCable	128,600
7. Communications Properties	245,444	17. Storer Cable	126,099
8. Sammons	242,792	18. GE Cablevision	115,000
9. Cablecom General	190,729	19. Athena Communications	101,000
10. United Cable Television	184,000	20. Cablevision Properties	88,029
Total 1-10 (38.6% of all cable subscribers)	4,194,648	Total 11-20 (11.7% of all cable subscribers)	1,272,481

Source: 1976 CATV System Directory

*Mary Alice Phillips offers one scenario in which cable television exhibits a growth pattern similar to that of the American automobile industry—ultimately resulting in a few "giant" operators (in her book, *CATV: A History of Community Antenna Television*, Northwestern U. Press, 1972, p. 171).

Conclusion

Although the blue-sky talk regarding CATV's role in creating a "wired nation" no longer echoes loudly in the halls of Congress or the pompous prose of the ill-informed expert, the facts are these:

- CATV is alive and well and in many localities is operating profitably.
- When CATV can provide complete access to the population of a given geographic area, it can compete effectively on a cost basis with other media in delivering educational and social services—provided the delivery does not require *two-way* video transmission.
- When local franchising authorities, such as those of Shawnee Mission, Kansas, insist on the availability of two (or more) "free" channels for educational purposes as a part of the cable operator's franchise agreement, CATV can become a powerfully useful, as well as cost-effective educational/social service delivery medium.

Over-the-horizon technologies may enable CATV, during the 1980s, to provide economically the multi-channel (10 or more channels for simultaneous program distribution) and the two-way audio-video and digital circuit capabilities required for the delivery of many educational, social and medical services.

Then, and only then, will CATV fulfill its once-forecast significance in American life.

REFERENCES

1. Head, S.W., *Broadcasting in America: A Survey of Television and Radio* (3rd ed.), Houghton-Mifflin, 1976, p. 367.
2. Federal Communications Commission, *Cable Television Report and Order*, Docket nos. 18397 et al., (FCC 72-108).
3. *Television Factbook*, TV Digest, Wash., D.C., 1972-73 and 1977.
4. Sloan Commission on Cable Communications, *On the Cable—The Television of Abundance*, McGraw-Hill, 1971, pp. 38-39.
5. National Cable Television Association estimate.
6. *Television Factbook*, 1977.
7. National Cable Television Assoc. estimates.
8. Moss, M.L., "Cable Television: A Technology for Citizens," *Journal of Urban Law*, vol. 55, 1978, pp. 704-705.
9. *Ibid.*, pp. 715-716.
10. Pachuta, J.J., "Training Firemen with Interactive TV," *Educational and Industrial Television*, February 1978, p. 45.
11. *Ibid.*
12. Lucas, Wm., "Spartanburg, S.C.: Testing the Effectiveness of Video, Voice and Data Feedback," *Journal of Communication*, vol. 27, no. 2, 1978, pp. 175-176.
13. *Ibid.*, p. 173.
14. *Ibid.*, p. 174.
15. National Cable Television Assoc., *Response to Option Papers on Cable Television*, Wash., D.C., July 1977, p. 1 of Summary.

Note: Information reported from M.L. Moss and Wm. Lucas (refs. 8-9 and 12-14) was derived from pre-publication drafts, which differ somewhat from the published versions.

How to Establish and Operate A Radio Reading Service Via SCA

Rosanna Hurwitz and Thomas Fish
The University of Kansas

A Radio Reading Service (RRS) provides printed information via closed circuit methods for people who are unable to read for themselves. Use of the service offers the possibility for a more independent life style to the blind, the physically handicapped and the elderly.

To establish a Radio Reading Service is a challenging experience. Planning surely spells the difference between real success and demoralizing failure. This chapter is written as a guide for those who are interested in starting their own RRS.

The Audio-Reader Service at the University of Kansas was launched through the generous efforts of a local philanthropist who decided the blind should have access to daily newspapers, books, and other information through radio. Stan Potter, director of services for the blind in Minnesota, who had pioneered the first Radio Reading Service,* told her how the service in St. Paul operated. She bought a new transmitter for the main channel—KANU-FM—tape recorders, a cart machine, a turntable and 500 receivers, and hired two staff members.

Audio-Reader, the second Radio Reading Service in the United States, went on the air October 11, 1971. Lacking organized support for the venture, our benefactor carried the costs by herself for a year-and-a-half. Several concerned members of the Kansas legislature managed to get the Audio-Reader added to the state library budget for one year, and the University of Kansas agreed to administer the program if the legislature would fund it the following year. That was five years ago. Our status remains much the same today.

How to Start Your Own RRS

In order to launch a Radio Reading Service that will continue to operate and grow, there are several important factors to consider. The priorities are as follows:

- 1) Form a general advisory committee of agency representatives, individuals, and private organizations to determine the needs and interests of the area to be served and to find eligible clients.

*See page 99.

- 2) Determine the availability of subcarriers of preferably public radio stations, and the interest of these stations in making a subcarrier available for this purpose.
- 3) Find an agency that shares your goals and is willing to provide at least some sort of basic budget and administer the service.

The latter might be an agency for the blind and visually handicapped, a state telecommunications agency, a university, a vocational rehabilitation agency, and so on. The possibilities vary from place to place, but a well-established funding agency with an interest in the radio reading service is critical in establishing and continuing the service. With a basic budget to depend on, grants to provide for special projects and programming can fill additional needs. (If, however, a granting program is the sole support of the service, questions arise concerning the continuation of what will have become a valuable service to those who depend on it, once the grant runs out.) The parent agency or organization ideally will share your goals, provide basic funding, furnish whatever other help is necessary, and let you provide your own service, developing it in the way that best meets the needs of your listeners.

When it comes to fund raising or influencing legislation and assisting your administrative agency, the general advisory committee is the nucleus to depend on. Committee members are the political trouble shooters and the people who can raise a matching grant, along with the parent agency. The group ideally should include newspaper publishers, representatives of local service clubs, elected political officials, radio and TV ownership, the Chamber of Commerce president, local industry, etc.

Administering the Radio Reading Service

The administering agency is a critical factor in the success of a Radio Reading Service. If this group is an independent, non-profit corporation, it must spend much time deciding the essential funding level, goals of the program, groups to be served, and the type of director the service needs. Good people in the past have been hired and fired because a board of directors was not willing to let a director direct. By the same token, the director should be sensitive to a fund raising group that rightfully expects to be fully informed of the program's workings. Total candor before commitment is essential on both sides.

If the administering group is a state agency, there will be a built-in advantage in having at least a basic operating budget and the established reputation of that group to back a fledgling Radio Reading Service.

We feel a state university or a college is particularly well-suited for this role. The direction of most educational institutions is three-pronged: academics, research, and service. The possibility of improving the quality of life for the blind, the physically handicapped and the elderly fits neatly into the school's service category. Further, a program that provides a broad range of services to many different groups, such as eligible print-handicapped people, is possible under the direction and sponsorship of a university. In the words of the Chancellor of the University of Kansas, Archie Dykes, "The Audio-Reader Service is an important part of the University of Kansas Outreach effort to serve all of the people of our State."

The University of Kansas provides its Audio-Reader Service with housing, utilities, a basic operating budget, students (who may participate for university credit).

grantsmanship expertise and an outstanding main channel that carries the signal. Audio-Reader was the first radio reading service to be housed on a university campus and we feel it is one of the best possible options.

Feedback from Listeners

Our programming advisory committee is composed of the listeners. It should be formed as soon as possible after the service takes the air and should contain a good cross section of the listeners.

Our committee consists of 50 people who volunteered via the annual survey we conduct of our listeners. We call them each month to ask certain specific questions. The answers provide new programming ideas. We ask on the air for comments on a regular basis, so input is not limited to this group.

Facilities and Staff

After you have ascertained the needs of your area and organized your supportive general advisory committee, found a subcarrier to use and an agency to take fiscal responsibility, you are then ready to find space, hire staff, buy the necessary equipment and recruit volunteers.

Space should be adequate but need not be lavish. We house seven full-time staff, two half-time people, a guide dog, nine announcers, and anywhere from 75 to 100 volunteers in 955 square feet of space. We also have the use of the basement for storage.

A small reception area is nice, but office space (which may be shared), recording studios (which can be very small and must be sound treated), an on-the-air studio and a control room are necessities. Ideally, you should have additional space to audition tapes, store, pack and mail receivers, a production and interview studio for special local production, tape library space, and somewhere to meet with the volunteers, students and visitors.

Your space could be anywhere, but when decision time comes, think of accessibility for the handicapped, for older volunteers and students, adequate parking, and neighborhood noise. (Unless the insulation qualities of your building are excellent, or you are prepared to soundproof the whole area, look for a quiet spot.) If you pay your own rent, you will decide on the basis of your pocketbook.

Next comes the hiring of staff. The number of people you can hire will naturally depend on space and budget. Critical to your operation is a director who cares deeply about your goals, knows how to implement them, likes working with people and will work twice the hours you can pay to get the job done. Of equal importance is a technical director or chief engineer who can install equipment, do preventive maintenance and advise on the purchase of appropriate equipment. We would advise you to buy the best equipment you can afford.

From personal experience, we most earnestly recommend that professional broadcasters be hired for the director and technical director positions. Whether or not the FCC considers us broadcasters, that is exactly what we are. We broadcast an all-talk format, which presents challenges that many commercial and public broadcasters never have to meet. Professional broadcasters can contribute the skills and techniques that keep listeners from becoming bored, as well as the knowledge of format and programming that can be a significant factor in the "listenability" of a Radio Reading Service.

The third person to hire should be an office manager to keep books, records, volunteer schedules, and do the typing. A program director and/or operations manager to oversee the announcing staff and assure the smooth flow of volunteers, students and other personnel, is very helpful. We also have a blind student who auditions all tapes to assure their quality and calls our Program Advisory Committee each month to get their programming suggestions and feedback. We have a field engineer and a rehabilitation program director as a part of our vocational rehabilitation grant. Add a 10-hour-a-week development director (who actually works more like 35 hours per week), a secretary-receptionist, and a traffic person who does the program logs, publishes the monthly program guides and helps with receiver records, and you have a picture of the Audio-Reader staff. (See figure 1.)

The essential staff members for a new service are the director, chief engineer and the office manager, plus the necessary announcers. This staff will get and keep you on the air, if you have a willing group of well-trained volunteers. (Audio-Reader operated for a long time with a director, an assistant director/engineer, and a few students on work-study grants who served as announcers and handled the typing.)

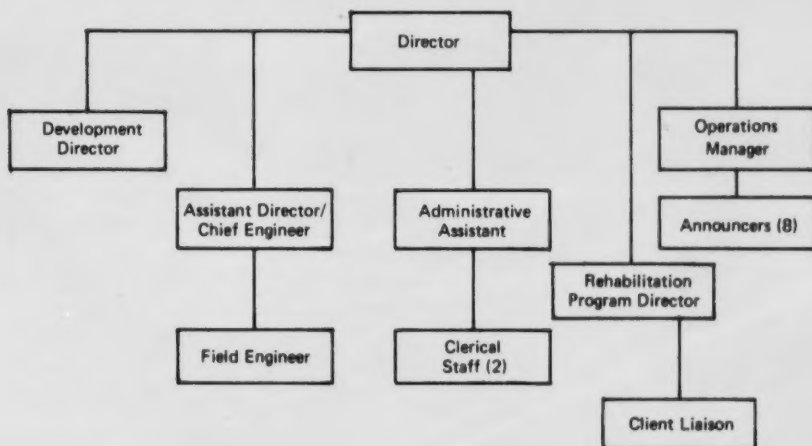


Figure 1. Staff of the University of Kansas Audio-Reader Service.

Programming

The purpose of a radio reading service is to give print handicapped people access to printed information that is not generally available to them. The most popular program any radio reading service provides is the reading of the daily newspapers. Access to this information creates opportunities for greater social interaction as well as greater personal independence. We offer the most recent best selling books, current magazines, and feature programming that includes weekly grocery shopping information, as well as practical suggestions in the form of vocational rehabilitation information. Audio-Reader provides a monthly program guide for its listeners in large print or in braille.

Technical Considerations & Costs

The equipment necessary to start a Radio Reading Service might include that described below.

The FM transmitter has three main sections: the exiter, the driver and the final power amplifier. The subcarrier generator is the most important part of the system. It is a small part of the exiter which multiplexes or modulates the Radio Reading Service on the air; it must be compatible with the exiter. If your local FM radio station does not already have this important part, the generator might be purchased as an option to the existing exiter.

If you are planning a new FM station or Radio Reading Service and will be purchasing a new exiter with the generator, specify 6 kHz deviation for the generator. This will enhance your signal by providing extra loudness in the fringes of your listening area. The injection level should be adjustable on the exiter and should be at 10 percent of the total modulation of the main channel, assuming a stereo operation. The price on this will be in the neighborhood of \$1,000 to \$1,500 for the generator and \$4,000 to \$7,000 for the entire exiter package.

For legal installation, compression and limiting equipment will be needed to achieve the highest possible loudness without over-modulation. A subcarrier modulation monitor will need to be purchased to measure "on air" modulation, injection and frequency deviation. The cost of this equipment varies with the manufacturer, but should fall in the range of \$3,000 to \$5,000. In some cases, the FM main channel may already have this equipment on hand, if they have been previously using their subcarrier for other purposes—background music, meter telemetry, and so on.

Distribution amplifiers may be needed at the studio location, if you are planning a large studio installation with many inputs and outputs. Patching facilities would also be needed in that case. If you are at a remote site from the main channel FM station, you probably will have to use a telephone audio loop to feed the main channel station with the program material. Whether or not a program amplifier would be needed in this situation would depend on your individual service. It is advisable to consult with the main channel engineers on these items. Prices for amplifiers, etc., might range from \$1,000 to \$3,000.

Miscellaneous items could include tools, wire, switches, lamps, AC hardware, meters, and so forth. These items are costly and take a long time to be delivered—plan ahead. Costs on these essential parts will vary, but you can count on \$1,000 to \$3,000.

The audio console purchase will depend on your budget, but you should take into account how many audio sources you will have to mix on the air. How many mikes? How many lines? There is a wide variety of items from which to choose. Again, the main channel engineers can give helpful advice. Buy the console to suit your needs from a reputable company, preferably with a guarantee to cover repairs. Some of the newer consoles are modular, so that the working circuit cards may be removed and returned to the factory for repair. Costs range from \$1,000 to \$30,000.

If you are planning to incorporate music into the programming, you will need to purchase one or two turntables and associated tone arms, magnetic cartridges and preamplifiers for both the "air studio" and the "production studio." Good turntables for broadcasting can be cued faster and easier than the home entertainment machines. Consult the trade publications for these and other items.

How many microphones will you need? Determine how many readers you will have at any one time. For example, an interview or newspaper studio might require two to four microphones; the recording studios for books need one for each room. Costs range from \$50 to \$200 per microphone, except for condenser mikes, which cost from \$400 to \$500.

To determine how many tape recorders you need, first decide how many recording rooms you wish to have. One tape recorder is required for each room. For the actual "air studio" we would recommend three or more machines to add the most flexibility. A minimum of two is necessary to permit smooth program transition. If you produce your own feature programs, you need a production studio, which requires at least three additional machines. Buy the best you can afford. Prices range from \$1,000 to \$3,500. Avoid home entertainment equipment, since it is not designed to withstand long, continuous use.

Broadcast tape cartridge machines are not mandatory but will enhance between-program capability. Prices range from \$400 to \$700. Cassette equipment provides flexibility in gathering information from the field. They are compatible with equipment of the Library of Congress and some other Radio Reading Services. Prices range from \$75 to \$300 per monaural unit.

Who Is Listening?

Audio-Reader currently has 1,200 individual SCA (subsidiary communications authorization) receivers distributed. The breakdown by the age of our listeners is as follows:

<i>Age</i>	<i>No. of Listeners</i>
0-19	6
20-39	12
40-59	50
60-92	1,132

The average educational level reached by our listeners is high school graduation.

There are also several central hospital installations where patients can listen throughout the hospital on ceiling or pillow speakers, or on unused TV channels within the hospitals' cable TV installation. There are presently seven hospitals with 2,660 patients who have access to the Audio-Reader program in this way.

Other patients in 57 nursing homes are being served. Most of the nursing homes have established special listening areas so that many listen together to daily newspapers, a favorite book, or special programming. These nursing homes house from 30 to 200 patients each. Those who are not ambulatory and want individual receivers are sent one for personal use. We know of only one senior citizens center with an Audio-Reader listening room, but other such installations are planned. An additional 1,000 individual receivers will be distributed this year, and many more hospitals and nursing home installations are planned as we expand our listening area.

Recruiting & Training Volunteers

Before embarking on the task of recruiting volunteers—a most critical aspect of a Radio Reading Service—several factors need to be considered.

- Who are your listeners?
- What is their average age?
- What educational and cultural interests will you need to cover?
- Are you programming for an urban or a rural population, or both?

A survey sent to prospective listeners will provide this information. Once these factors are determined and you know for whom you are programming, you will know what kinds of volunteers can best meet the needs and expectations of your listeners. Possibilities for providing volunteers might be found in community resource organizations such as those that coordinate community volunteer activity (a volunteer clearing house), service clubs, church groups, the League of Women Voters, and the American Association of University Women. If a college or university is part of your community, faculty members and spouses, students, and retired staff and teachers offer excellent recruitment possibilities. Do not overlook valuable help available from the retired members of your community. Members of the American Association of Retired Persons (AARP) and the Retired Teachers Association are often good readers, and they have the time to help you. In beginning your drive for volunteers, do enlist the help and support of the local media. If the newspapers and local radio and television stations publicize your efforts, many people will seek you out to offer their help.

How do you screen prospective volunteers? Two people on our staff handle screening—the operations manager and the director. After a brief visit just to put the guest at ease, the prospective volunteer is given a list of 100 words to read aloud. Fewer than ten mistakes means we have a potential newspaper reader.

If the vocabulary test is passed, we then have applicants read a newspaper article and a brief passage from a book to give us an idea of their style and where they will best fit into our format. We make a big effort to fit readers to their favorite areas of interest.

Turning down volunteers requires tact. We usually tell them of other areas in which we need help and suggest other activities, such as helping in the tape library or visiting nursing homes. What if a poor reader has already been accepted or if a formerly good reader's performance can no longer be tolerated? There are no easy answers to this question. Occasionally a volunteer can be shifted sideways or steered towards a different kind of reading material. Others can be given help to improve their reading.

Reading for Credit

Another source of volunteers for those of us on a university campus are students who want to earn credit. At the University of Kansas, students in some journalism and speech courses may enroll for one or two hours of credit (three hours a week for one credit-hour and five hours a week for two credit-hours). As the students have no papers to write and no exams to take, we are very tough. *July*

must produce many hours of material, and it must be excellent. Each hour missed is subtracted from the final grade. Students who miss seven hours earn an Incomplete and must start from scratch the next semester. If they do not make it the second time, they earn an F. We have acquired some of our most dedicated volunteers from among these students, many of whom return semester after semester as volunteers after they have earned their maximum five hours.

Other Volunteers

Children occasionally record for us to add variety to our sound. Their voices are lighter and offer good contrast. One nine-year-old has just completed a series titled *Career Opportunities Unlimited*, for which he interviewed all sorts of people to discover what their jobs entailed and to see if handicapped people had the opportunity to do the same work.

When putting together the program logs and the monthly schedule and program guide, male and female, light and heavy voices are mixed to give as much variety to the sound as possible. We are not looking for professional performance—just friendly people who can project their interest in others and who have clear, easily understood voices.

Without these wonderful people, the most exotic decor, equipment and physical plant are worthless. The best advice we can offer is to recruit with enthusiasm, screen and train with care, and be certain to communicate your appreciation to this most vital aspect of your radio reading service.

National Organizations

In 1975 the First Annual Convention of Radio Reading Services was held in Oklahoma City under the sponsorship of the American Foundation for the Blind. Many representatives of various national groups interested in this new concept in electronic media were present. Such groups as the National Federation of the Blind, the American Council for the Blind, Radio Station Management, the Library of Congress, the Corporation for Public Broadcasting and the radio reading services themselves were represented.

The Corporation for Public Broadcasting has arranged with National Public Radio to initiate a pilot project specifically for radio reading services. The project will include ten hour-long programs in a magazine format with topics that pertain directly to the needs of radio reading service listeners.

The American Foundation for the Blind continues its interest in Radio Reading Services with support of convention efforts and Regional Seminars using their own national experts and resource people from The Association of Radio Reading Services.

Conclusion

The establishment of a successful Radio Reading Service—one that combines the elements of responsiveness to listener needs, that permits volunteers the satisfaction of time spent in a fulfilling way, offers community and state leaders a meaningful outlet for their influence and generosity—can be accomplished if the basic elements are patiently brought together. The step-by-step organizational structure is critical to providing a strong, ever-growing Radio Reading Service that offers listeners greater personal independence.

Rosanna Locke Hurwitz is director of the Audio-Reader Service at the University of Kansas. With a B.S. in special education, speech and hearing, she has served as a speech therapist in two public school systems. Before joining the Audio-Reader staff in 1974, she was community affairs director for KLWN Radio in Kansas. She was elected to the executive committee of the National Association of Radio Reading Services in March 1977.

Thomas F. Fish is assistant director and chief engineer of the Audio-Reader Service. While majoring in radio and television film at the University of Kansas, he worked for the University's KANU-FM. He joined the Audio-Reader staff in 1974.

Radio Reading Service: The Minnesota Experience

C. Stanley Potter
Minnesota State Services
for the
Blind and Visually Handicapped

In the mid-1950s, the Minnesota State Services for the Blind established its Communication Center. It grew out of needs expressed by blind people, their counselors and their teachers. While library services in braille and on recorded talking books had been available in the United States through the Library of Congress and Regional Libraries, the only material that dealt with current happenings in the state was *The Minnesotan*, a monthly braille magazine. Its circulation was limited to about 300, since the demand for braille materials was declining. The decline resulted from the rising proportion of blind people who had lost their sight as adults, of whom fewer use braille for reading. The first purpose of the Center was to put material of local and current interest from *The Minnesotan* into recorded form to be circulated biweekly for auditory reading, in order to reach many more people.

Also in the mid-1950s, blind and visually handicapped children were in ever increasing number remaining in their home school districts and being educated with their seeing peers, rather than in state schools for the blind. This meant that textbooks in almost infinite variety had to be transcribed from print into braille and on tape. Individual students needed the books selected by local officials for the education of all children in their districts. Textbooks are published in such variety that many of the books transcribed are used by only one child or college or vocational school student. Others, over a period of time, are used by many.

The second purpose of the center was to provide all students with all the books they require for their studies, in a form that enables them to read them on their own, and that is available through a single center resource. Carefully selected, well-trained volunteers with a variety of talents and backgrounds, who could sight-read fluently and accurately, have enabled us to provide on demand a high volume of such diverse materials.

Unserved Needs

While that was a good start in approaching our communication requirements, it soon became apparent that other cultural and social changes were affecting the blind and physically handicapped and their communication needs:

- 1) More and more blind people were finding employment in industry, in the professions, in the service occupations, and in business.
- 2) More and more handicapped homemakers were using rehabilitation services to develop compensatory skills in mobility, personal self-care and in the care of their family. With their new independence, they were becoming more active in women's organizations, church groups and local political interest groups.
- 3) Fewer and fewer of the increasing number of elderly blind people were living with their children. More of them were receiving rehabilitation services that permitted them to maintain themselves in their own homes. Many of those with other illnesses were living in rest homes.

In summary, the younger blind people were living and working with people who saw and read and talked about what they read. Many of the older people, whether at home or in an institution, had lived their lives as seeing persons with newspapers and other printed material about them, until they lost their sight. Both groups were denied access to the world of immediacy that they needed to exploit the emerging opportunities for acceptance and social intercourse.

Library materials in recorded form are a great asset to many, but they are no substitute for the "localism" that a newspaper brings, nor do they bring current best selling books while these are still fresh. It takes several months to select and have books transcribed and placed in regional libraries and, as with any library service, the number of copies is limited. A person may wait for months to borrow a requested book. (I will never forget the blind woman who said to me, "By the time I can get a best seller, the ladies in the beauty shop have quit talking about it for six months.")

The Search for a Solution—Why SCA?

We were faced with a problem: a substantial group of *visually and physically atypical* people were rapidly becoming *socially and vocationally typical* participants in society, but lacked the current and local information available to the people around them. For a long time, radio seemed the obvious answer, but in what form? On what frequencies? At what cost? After examining these questions, it appeared that a good answer, and perhaps the best one, might be found in the subsidiary carriers of existing FM stations. They offered several advantages:

- 1) In the crowded spectrum, requests for additional frequencies would be unnecessary.
- 2) The cost would be within reach, since the expensive transmitters, towers and antennas were already present for another purpose. The remaining expenses of any broadcaster — studios, program production equipment, automatic level controls, personnel and SCA rental — seem manageable.

*Subsidiary Carrier Authorization. Any FM transmitter can broadcast several programs simultaneously, provided the necessary encoding circuitry is used. The desired program can then be separated from the other decoding circuitry, if it is present in the receiver being used. Stereo broadcasting of this capability and a third channel is very feasible, usually at 67 kHz above the main channel.

- 3) At 100 megahertz, signals are stable day and night, affected little by changes in the ionosphere, which alters reception patterns on the lower frequencies. These frequencies are not limited as severely by terrain as are the much higher frequencies.

Yet what could one-tenth of the power of even a full-power FM station do in a state that spans 300 by 400 miles? What performance standards could be obtained technically in SCA receivers and at what cost?

To answer these questions, in 1967 we began to investigate. We found that SCA technology in receiver design and transmission standards had not been given a great deal of attention, but we were able to determine that one could expect good SCA performance for distances from a transmitter equivalent to the reception of stereo, which — depending on main channel power, terrain, antenna height, full legal SCA injection and effective automatic level control — was 50 to 60 miles. If an outdoor directional antenna cut for the transmitter frequency was used to replace the customary receiver whip, somewhat greater distances were attainable.

Since that time, receiver design has substantially improved. The improvements do not extend reception capability much, but provide vast improvement in the quality of the SCA signal, greater freedom from crosstalk, and — with some manipulation of the audio frequency curve — better and more pleasant readability.

The Radio Talking Book Network

The Minnesota Radio Talking Book Network began its transmission on January 2, 1969. In those early years, broadcasters in many parts of the country were concerned about the use of SCA, because of what was known as the "birdie," a variable whistling sound that could be heard when listening to a main channel with SCA operative. The birdie turned out to be a receiver phenomenon that disappeared with the introduction of the phase locked-loop circuitry now common in FM receiver design.

The Minnesota Radio Talking Book now uses a network of ten transmitters and transmits reading matter, mostly very current, nineteen-and-a-half hours a day, 365 days a year. Its audience is made of 4,000 individuals to whom receivers have been loaned, and the residents of several institutions with high populations of handicapped and aging persons. Institutional systems consist of an SCA receiver feeding one channel of an audio distribution system, which the hospital or other institution may already have available, or the receiver may be a carrier current type of retransmitter, so that the signal is available throughout the facility in the rooms of residents or patients.

The type of receiver used in individual homes is crystal-controlled, has a single combination power switch and volume control and, in addition to its internal speaker, a low impedance output jack for the headphone supplied. This jack doubles as the output for feeding a tape recorder or other audio device.

For those extremely handicapped by paralysis or other disorders, an easily installed touch-sensitive remote switch is supplied by the agency. This permits listeners to turn the receiver on and off if they can move any part of their body even slightly.

In our own lab, we build a small carrier current transmitter, the output of which is in the order of 200 milliwatts. This unit is installed inside the cabinetry of receivers to be loaned to those who are active in their homes and need to be

able to read in any room. A small handheld battery-powered receiver is supplied, however, which is fixed to the frequency of the retransmitter.

Why "Radio Talking Book"?

"Talking Book" is a term with which the public is widely familiar. Radio's purpose is not to replace the phonograph talking book, nor the more recent tape talking books. Its purpose is to add a new dimension to auditory reading: it is immediate and has the capacity to be local. It should not be considered a substitute for library services in which a person can choose what to read and when to read it. Like all other immediate media — newspapers, radio, and television — it must be programmed, and the programmers must devise systems that will provide for broad input from listeners and will be guided by their reactions.

Summary: The Advantages of SCA

We have found the SCA system of providing a radio talking book service (or whatever you wish to call it if you are doing similar programming) an appropriate and highly desirable medium. It is perhaps the only feasible method of doing what we want to do, for the following reasons:

- 1) It is the only cost-effective system for providing full-time service (in Minnesota, 19½ hours a day). To us, full-time service is important, since we want to include a broad cross section of the materials being read by the public. We want to meet the needs of people with a wide variety of interests. We want to provide materials usable by people with various levels of comprehension, and we want time to provide programming for those with shorter attention spans, such as some of our institutionalized and older listeners.
- 2) The SCA is regarded by the FCC as a private means of communication. We have a stable, gradually increasing audience that has come to understand why we include books that many people like, but that others find offensive. (If our signal were available to a continually variable public audience, we would be under frequent criticism from people who do *not* understand.) Our readers do tell us what they think, and sometimes in no uncertain terms. I quote two reactions to the same book:

Who selects . . . the filthy books . . . such as the 8 p.m. book (*Fear and Loathing: On the Campaign Trail '72*). You are beating the commercial stations — filth — maybe it will bring you notoriety. As ye sow so shall ye reap. You have many good things on.

. . . All of the volunteers are pretty wonderful. I especially like Eunice Grier and I enjoyed Lawrence Becklund reading *Fear and Loathing: On the Campaign Trail '72*.

While much of what we read would not be considered offensive by anyone, we do read material that many people might read comfortably in private, but that few would read aloud to another. Many feminine listeners have told us that from our "Strictly Feminine" program they have learned

a great deal about everything from hair-dos to clothing styles to sex. About the latter, they gained information they had no idea women around them were reading, and that no one had read them or talked to them freely about.

What about the magazines and books that are printed specifically for the purpose of stimulating vicarious sexual experiences? People who can see are free to find such stimulation in many ways, from reading to just plain girl (or boy) watching. We can include such materials in closed circuit broadcasting, and the earphone provides privacy in reading whatever one chooses to hear.

- 3) The third virtue of the SCA system is that it permits us to read copyrighted materials without requesting permission, which must be the case if the material is to be fresh. We are careful about eligibility: only those who cannot effectively read printed materials, because of visual or physical handicaps, are listeners. They are people who would not buy a publisher's book or magazine, because in its printed form they cannot use it.

Radio Reading Services are gradually growing in various parts of the nation. Some of them are operated by broadcasters as an additional service to the handicapped population. More are operated by agencies for the blind, public or private, or by organizations established for the specific purpose of developing and operating a Radio Reading Service. Except for the broadcasters who provide the service themselves, most organizations are leasing the SCA capability. Some systems serve a single urban area. Others, through networking, serve a whole state. There is no doubt that radio reading is rapidly becoming a highly important influence in the lives of handicapped people.

There are now approximately 50 Radio Reading Services using the SCA medium in the U.S. and Canada, plus about 25 planning sites. The Association of Radio Reading Services was formed at a national conference in 1977. The Association is concerned with legislation and giving its members technical, organizational, program and fiscal development advice, as well as with the publication of other relevant information. Further information may be obtained by writing the author.

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Teleconferencing + Telewriting = Continuing Education in Wisconsin

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The telephone is a look-twice phenomenon. At first glance it appears to be a limited medium with little potential in education. The telephone has thus often been ignored in favor of its more glamorous sisters—television, radio and computerized instruction. But a second look reveals its particular advantages: The telephone is interactive, flexible, inexpensive, widely available and supported by a well-developed infrastructure. It is an audio *and* visual communications channel. Using telewriters, graphic input devices or slow scan televideo systems, a telephone network lends itself to a variety of instructional formats.

In short, the telephone is uniquely suited to many educational roles, one of the foremost being the delivery of programs to a new generation of adult learners.

Continuing professional education and avocational adult education are two of the fastest growing areas of higher learning. Their rapid growth reflects both a new philosophy of education and the need for professionals to keep abreast of information. It is also the result of the simple demographic fact that the U.S. is becoming a society of older people. In the present decade, the number of 25 to 34 year olds will increase 44 percent, and this dramatic shift to an older population will continue well into the 1980s and 1990s.

Higher education has traditionally focused on full-time, on-campus youth enrolled in formal degree programs. However, the new post-secondary student, the adult, has a different view of education and wants the opportunity to learn in his or her home community. These part-time learners of all ages and lifestyles have diverse learning needs. Rather than defining education as a terminal degree program to pre-

pare one for future goals, the adult learner sees education as a self-directed activity that continues through life. Education, conceptualized as lifelong learning, is a vehicle for on-going vocational development and leisure-time pursuits.

Aside from a personal interest in professional growth, continuing education is increasingly viewed as a necessity in many fields, including engineering. The tendency for professional associations and licensing boards to encourage continuing education will most likely accelerate, forcing educators to revise their curricula and teaching methods.

The adult learner is also often a distant learner who requires non-traditional delivery systems. To reach adults in their home communities, higher education, which is primarily campus-based, must implement new modes of instruction. The development of outreach programs, however, is often limited by budgetary constraints. The delivery of instruction to students near their homes or places of business is usually not justified economically if an instructor must travel great distances to serve a few participants at each classroom site. What alternative, then, is most economically feasible, makes best use of teaching resources, and effectively meets the educational needs of distant adult learners?

In response to this question, many educators are turning to the telephone, one of the oldest and most effective mediums. Although invented over 100 years ago, it remains the basic instrument of the new communications technology. Following many small-scale experiments in the 1960s, the telephone's unique advantages are leading to a second generation of educational telephone networks in North America and Europe.

There is almost universal agreement that two-way communication is a necessary element of long-distance education.¹ A telephone network is interactive, allowing students and instructor to exchange information, ask questions and receive immediate feedback. The process of interaction between faculty and students and among students themselves is perhaps the most important of the educational processes. While television and radio may be appropriate for some courses, these essentially one-way systems fall short when discussion and immediate feedback are required.

A television network, which uses cables, microwave or broadcast channels, is also costly and cannot easily be modified to incorporate new receiving locations or to shift transmission sites. A telephone network can use various combinations of dedicated and dial-up lines to minimize cost while maximizing reception and transmission flexibility. For example, dedicated lines may interconnect any number of remote classrooms, while dial-up lines give people at other locations access to the network.

The telephone also offers instructional flexibility. Course materials can be modified easily at reasonable cost. The latest telewriting equipment or slow-scan televideo system can display a variety of graphic or pictorial information to supplement audio instruction.

In Wisconsin the focus has long been on the telephone. The Wisconsin idea—that the boundaries of the campus are the boundaries of the state—provides the philosophical base for statewide outreach programs. In this supportive environment, the University of Wisconsin Extension's Statewide Extension Education Network (SEEN) and Educational Telephone Network (ETN) have flourished. Today these telephone networks annually attract over 30,000 students—engineers, teachers, physicians, nurses, librarians, lawyers, business people, social workers and others.²

Wisconsin's Statewide Extension Education Network (SEEN)

Wisconsin's Statewide Extension Education Network illustrates the application of the telephone to engineering education. SEEN was developed in 1969 to meet the instructional needs of extension engineering. For the past eight years, its unique capability for both audio and visual programming has made it possible to deliver continuing education to engineers throughout the state, even in the most isolated communities of northern Wisconsin.

SEEN uses leased, commercial telephone lines to simultaneously transmit audio and visual material to many widely separated classrooms. Two-way audio communication allows students at any SEEN location to participate actively in the course, asking questions and exchanging information with the instructor and fellow students at all the connected sites. Electrowriters supply the visual element. Any material that is customarily shown on a classroom chalkboard—equations, diagrams, outlines, graphs, line drawings—can be presented instantly on the electrowriter and transmitted over the telephone lines to all SEEN locations. Students view the material exactly as it is created by the instructor and may comment or ask questions any time during the session.

The SEEN system links more than 20 locations throughout Wisconsin (see figure 1) with approximately 3,500 miles of long-distance telephone lines. The locations were selected according to population densities, educational needs of local residents and distribution of engineers and other professionals in the state. This configuration allows the network to serve 80 percent of Wisconsin's engineers and technicians. The classroom settings vary; some are in county courthouses, while others are on campuses or in manufacturing firms. In addition to intra-network communication, a telephone call from anywhere in the U.S. can be tied into the system, thus providing contact with outside experts.

Programming for Engineering Education

Extension Engineering offers SEEN programs in both non-credit continuing education and credit undergraduate and graduate education.³

Continuing education, the largest program and the basis of the entire Wisconsin teleconferencing network, is directed to the practicing engineer and other professionals. Engineering courses are usually conducted over a six- to eight-week period, meeting once or twice each week. They tend to be practical state-of-the-art courses tailored to the needs of professional engineers (e.g., Industrial and Manufacturing Engineering Refresher). Continuing education courses are usually offered between 4:30 and 10:00 p.m., Monday through Thursday, times that are convenient for working engineers. Participants earn Continuing Education Units (CEU) for each program satisfactorily completed.

Wisconsin engineers who enroll in continuing education programs have a unique opportunity to earn a professional development degree in engineering, a post-baccalaureate degree pioneered at the University of Wisconsin. The P.D. program is based on the special needs and personal objectives of the full-time employed



Figure 1. The SEEN network serves 80% of Wisconsin's engineers and technicians.

engineer. Each engineer's plan is flexible and can be changed to reflect new learning objectives. The 120 CEUs required may be earned in short courses, institutes and seminars, workshops, correspondence study, video cassette courses and individual guided study programs, as well as in SEEN courses.

Undergraduate and graduate credit courses are available to both off-campus and on-campus students. These courses are customarily conducted during the morning or afternoon hours. Continuing engineering students may also take the courses at any SEEN site. Resident campus students are usually enrolled in SEEN courses

that are simultaneously telecast to the 14 two-year campuses of the University of Wisconsin Center System, an arrangement often more economical than offering separate classes at each school. In many cases, the inclusion of working students who are occupationally associated with the subject matter has added much to the relevance and scope of instruction. In such subjects as product liability, welding metallurgy or pollution control, the experienced engineer has contributed much to the course and challenged the instructor to keep abreast of engineering practice.

Engineering SEEN courses may originate in Madison, Milwaukee, Wausau or other locations, allowing flexibility in program topics and the most effective assignment of faculty specialists from any part of the state.

Administration Is a Cooperative Effort

The administration and management of the SEEN engineering programs involves three groups: Instructional Communications Systems, Extension's Department of Engineering and Applied Sciences, and Extension agents at the local level.

- Instructional Communications Systems (ICS), a division of University Extension, is responsible for administering SEEN, coordinating network programming and managing the technical system. Coordinating functions include program scheduling, instructional design, promotion and evaluation. ICS also serves as a liaison between Extension Engineering and the local agents. Technical management of the system involves the operation and maintenance of the telephone network, studios, classroom hook-ups, electrowriters and audio equipment, as well as the production, recording and distribution of programs.

- In Extension Engineering, course design, faculty identification and all academic matters related to SEEN programs are managed by the director of Electronic Media Programming in Engineering (EMPE). The EMPE director initiates courses, conducts direct mail promotion and coordinates with other Extension departments, such as math, business and management, concerning offerings of probable relevance to engineering clientele.

- The third branch of administration is provided by the Local Program Administrator (LPA), an Extension agent headquartered at or near a SEEN location. The LPA is the contact person at each site, who is responsible for scheduling, managing, and promoting programs locally. The LPA may also have a program aide to welcome and assist students and to operate the audiovisual equipment.

The Faculty

The instructional services for SEEN courses are supplied by three types of faculty: 1) the professional staff of Extension Engineering; 2) the teaching faculties, primarily in engineering, at five or six of the 27 campuses in the University system; and 3) the engineering and industrial community with appropriate experience and teaching expertise.

Faculty in the first category supply the bulk of the non-credit offerings, which deal with their areas of professional competence. These teachers are able to respond quickly to the changing aspirations of continuing engineering clientele. Participation in SEEN teaching is encouraged as a substantial method of professional advancement.

The SEEN courses offered for credit are generally taught by resident campus faculty and adapted directly from existing courses offered to students on campus. Courses offered by these faculty members are generally those simulcast to the network from a class of resident students. Teachers in this category were in the past compensated by an "overload" payment in addition to their regular faculty salary, but they now often engage in SEEN programming as part of their regular academic activities.

Building on the long experience of the evening non-credit offerings based in Milwaukee, some of the SEEN schedule is devoted to simulcast versions of these courses. The instructors may be from any of the three types of faculty. Those not on the staff of UW-Extension are usually compensated at an hourly rate.

SEEN Engineering Programs At-a-Glance

Table 1 presents statistics about the SEEN engineering program throughout its operational life. Since courses differ in length, credit status, and design in relation to the contact hours required per credit, the CEU has been used to represent the total time spent by the student on the course, including outside reading and study.

Experience and projection show that the engineering portion of SEEN can be expected, with good management, to maintain an average of about 1,000 CEUs per semester, generated by about ten courses, each with approximately 25 students.

Table 1. SEEN Statistics, 1970-1977

<i>Semester</i>	<i>Number CEU</i>	<i>Enrollees</i>	<i>Avg. Enroll. / Course</i>
Fall 1970	652.8	77	7.0
Spring 1971	1202.0	157	17.4
Fall 1971	938.8	76	6.3
Spring 1972	827.3	88	11.0
Fall 1972	1324.1	181	15.1
Spring 1973	936.8	137	15.2
Fall 1973	906.0	153	17.0
Spring 1974	1168.6	295	29.5
Fall 1974	926.1	271	22.6
Spring 1975	1349.0	400	36.4
Fall 1975	933.6	183	22.9
Spring 1976	1051.5	273	24.8
Fall 1976	735.8	156	26.0
Spring 1977	733.2	286	28.6
Fall 1977	1139.4	275	25.0

The Technical System

A successful educational teleconferencing system, whether made up of two or 200 locations, includes three basic components: 1) the terminal or station equipment, 2) the interconnecting transmission system, and 3) the network control center. Among the variables that influence system design are the number of locations; the geographic area covered; the network configuration; whether the system is a four-wire, multi-point dedicated network or a two-wire dial-up network; and the network's intended use. No two designs are likely to be the same, but several ingredients are common to successful systems:

- 1) An educational teleconferencing system should be able to connect participants at widely scattered locations.
- 2) The system should provide a communications environment that duplicates (as closely as possible) the single-site discussion group.
- 3) Terminal or station equipment should provide even sound distribution and allow easy participation.
- 4) The system should be manageable, allowing additional locations and equipment as well as modifications to meet user's changing needs.
- 5) A network control center should provide a program origination point and essential supervision of the system's technical operation.
- 6) The transmission system should provide clear, intelligible communication between all points on the network.
- 7) The system should be able to connect groups anywhere in the world via regular telephone service.
- 8) Methods should be developed to recognize and clear quickly any technical problems interfering with service.
- 9) Equipment should feature the latest technology and be reliable and serviceable.
- 10) All terminal equipment, station location interfaces, and installation procedures should be standardized throughout the system.⁴

With these general capabilities in mind, the three basic components of the SEEN system will be described in greater detail.⁵

Station Equipment

Each of the SEEN classrooms has identical equipment: a Darome Convener for two-way voice communication and a Victor Electrowriter* to either transmit or receive graphic material. Using these devices, an instructor can present both audio and visual information to students in a number of widely scattered locations.

The Darome Convener** (figure 2) is a self-contained, portable conference set

*The Electrowriter, manufactured by Victor Comptometer Company, was an early pioneer in visual telephone devices. Recent developments in telewriting and televideo systems are reviewed at the end of this chapter.

**The Convener was developed cooperatively by Instructional Communications Systems, the Darome Company and the Wisconsin Telephone Company to meet the unique need for immediate, two-way communication in an extended geographic area.



Figure 2. Participants at all network sites interact via the Darome Convener, a portable unit with a speaker and 4 microphones.

that contains four microphones and a speaker that plugs into a standard telephone jack and AC power outlet. Students simply press a bar at the base of the microphone to participate in class discussion. Each microphone has a 20-ft. cord to allow easy access by students. As many as 16 microphones may be placed in a single classroom using a jack provided on the unit and audio mixers. The audio amplification system produces highly intelligible sound in a classroom seating up to 300 people.

Electrowriters permit the transmission, reception and projection of any visual material customarily shown on a classroom chalkboard. As shown in figure 3, the instructor writes on the electrowriter transmitter with a special ball-point pen. Pen position and movement create tone signals that are carried over regular telephone lines to electrowriter receivers in SEEN classrooms around the state. These signals are translated by the receiver into an instantaneous and faithful reproduction of the instructor's writing. The image on the receiver is then projected onto a screen, which becomes the classroom chalkboard.

The basic electrowriter system consists of a transmitter and receiver, each of which have an electronic pen, servo-mechanism, and a writing area of 17.5 square inches. The SEEN electrowriters were modified by Instructional Communications Systems to double the writing and viewing area, thus making a two-frame system. When one frame is being developed by the instructor, students can still see the frame previously discussed.

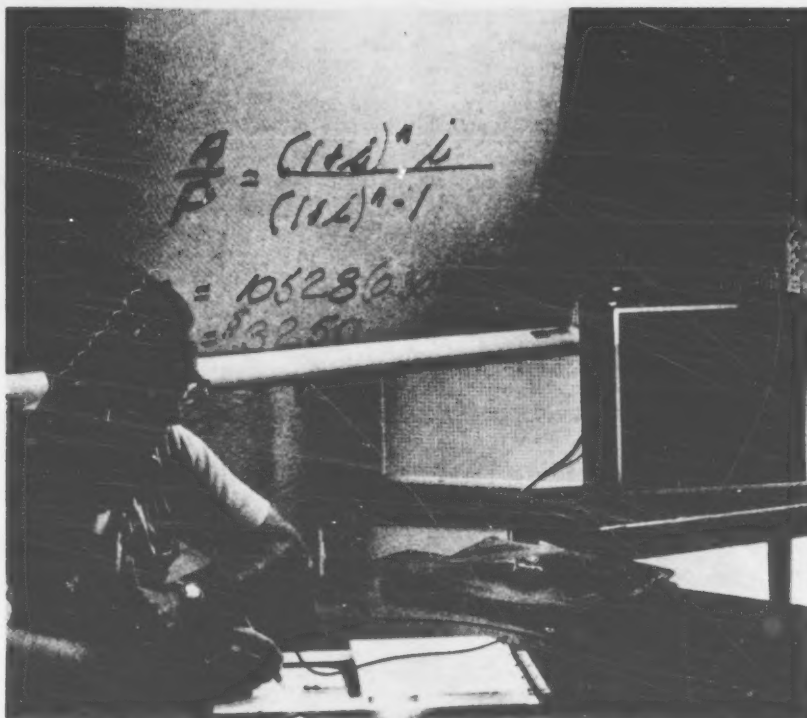


Figure 3. As the instructor presents written material on the electrowriter, it is projected onto screens in the SEEN classrooms.

Distribution Network

The SEEN system uses two dedicated, four-wire, multi-point teleconferencing networks; voice signals are transmitted over one network, while the second network simultaneously transmits the signals from the electrowriters. Having two of the four-wire networks gives the system greater flexibility, for both audio and visual information can originate from any SEEN location.

SEEN's dedicated system uses permanently installed facilities leased from the telephone company on a 24-hour-a-day basis. Because the listening centers are permanent, all points on the system are wired to operate like a party line. On a four-wire system of dedicated lines, each message is carried on its own pair of wires, eliminating feedback on the return loop. Greater control over signal levels, signal-to-noise ratio, and signal bandpass also results in a transmission quality far exceeding that of a two-wire conference system.

The basic building block of a multi-point, dedicated network is a four-wire, six-way bridge. Using this together with existing telephone transmission facilities, a network of any size can be designed. Since these bridges can be located regionally,

a network can be formed in a regional building-block fashion. The practical size limit for any region, however, is 20 stations, because of the noise created by the multiple facilities and circuit terminations. Most of the techniques used to construct a multi-point, private line teleconferencing system are standard operating procedures within the telephone industry. Equipment is available from several manufacturers and suppliers.

An important ingredient in a successful dedicated telephone network is the ability to connect other locations to the four-wire system. By bridging a dial-up call to the private line network, SEEN's coverage is extended to any location where there is a telephone.

Studio Control Complex

The studio control complex consists of studios from which programs may originate and a control room for network operation. It is located on the University of Wisconsin-Madison campus and is operated by Instructional Communication Systems.

The control room and studios were designed to provide smooth, trouble-free programming and to minimize the burden on the instructor. Because all technical aspects of a program are handled by a trained engineer, instructors are free to concentrate on their material and presentation.

The control room (figure 4), is equipped to handle program control, telephone



Figure 4. A control room engineer handles the technical aspects of program and monitors the network to detect any problems.

network control, studio sound control, monitoring, and network failure detection.

The control room technician uses a console to control program audio sources, such as tape recordings and microphones. For example, the technician loads any insert tapes on the tape machines and plays them on cue from the instructor. The technician also controls the electrowriter signals and records programs for future reference or "make-up" sessions.

Complete control of the entire telephone network is maintained in the control room. Before program time, the technician establishes the teleconferencing network, quickly tying in the appropriate locations. The network of dedicated lines can be arranged as programs and enrollments dictate. Participating locations can be selected for total system programming, or regional networks can be established and programmed simultaneously. Dial-up bridging controls also allow the technician to tie regular calls into the private network.

Studio sound system equipment is used to control the distribution of audio programming to the studios, so the instructor can hear the response from the network; to the control room, so all audio channels can be monitored; and to administrative offices, so staff can listen to programs. The control room also provides general building paging with emergency override to all areas.

Monitoring is crucial to the quality of network programming. Console controls and VU meters allow the technician to cue and listen to any of the audio sources without connecting them into the network or program. The technician is also able to monitor selectively the output levels at the distribution console and correct the level quickly. Transmit signals are monitored to check that signals are getting through the master bridges at the telephone company. Visual quality is monitored on an electrowriter receiver in the control room.

Quick detection and resolution of network failures is vital to the success of any teleconferencing network. Within a 16-hour programming day, an average of three or four system failures may occur on Wisconsin's two educational telephone networks. Adequate monitoring and test features are therefore necessary to minimize network downtime and program interruption. An experienced control engineer can isolate a problem quickly and identify the source, whether station equipment, transmission line, carrier system, or some other characteristic failure. More complex failures can be reported to the telephone test board, which then helps to isolate and correct the problem. Given the ability to quickly isolate a region, the technician can bypass the problem area and continue to operate the remaining parts of the network. A control room microphone allows the technician to talk to any point on the network.

The electrowriter transmitter is contained in a special table that keeps it flush with the table surface for ease of writing. The electrowriter also sits on a swivel base that can be adjusted for the most comfortable position. A microphone head-set frees the instructor's hands for writing.

An electrowriter receiver in the auxiliary control room is used to project the visual presentation onto the screen in the studio as the instructor writes on the transmitter. Eight bar-activated, table microphones allow students to interact with participants at other SEEN locations. Tables and chairs are arranged as a classroom setting, with each table having two microphones.

Program Planning

Effective use of the SEEN network depends on careful program planning. From the inception of a topic through final production, programming is a complex process that requires close coordination among the instructional department, ICS staff, and local UW Extension agents.

Program planning basically involves seven stages: content selection and development, network scheduling, operational design, program announcement, promotion, registration and production.⁶ Standard procedures guide programmers through this process. A 20-minute videotape acquaints programmers with the many elements involved in effective programming, including support services available at ICS and other Extension departments. A brochure on planning procedures is also available to programmers.

Content Selection and Development

The content of SEEN engineering courses is initiated and developed by Extension Engineering faculty. The EMPE director oversees the selection of courses and instructors.

For continuing education courses, Engineering has found that effective programming is based on an accurate determination of the education needs of its clients. These needs are determined through: questionnaire surveys; voluntary suggestions from both instructors and students; advice from persons such as industrial training directors or those serving on various continuing engineering studies advisory committees; and spontaneous "targets of opportunity" that indicate a subject likely to be of current interest to a specific clientele. For example, close watch is kept on legislation that appears to require an increase in some technical skill or knowledge, such as a new uniform single-family housing code or a solid waste disposal law.

Graduate and undergraduate courses are based on the more traditional requirements of a degree program as well as the willingness of an instructor to offer a course in the SEEN mode.

Scheduling of Programs

Program time on the SEEN network is usually scheduled at an annual meeting held in January. One or two weeks before the meeting, programmers are invited to submit programming requests for the academic year, which are sorted and preplotted on a master schedule to best utilize network hours and resolve conflicts before the meeting. The meeting itself allows programmers to review the entire schedule, negotiate hours if needed, and firm up their program times. Two weeks after the meeting, all requested network time is rechecked and confirmations are sent to the programming departments. Further requests for time can be made during the year.

Operational Design

The overall operational design of a program involves both the programming department and the Instructional Communications Systems (ICS) department.

Each group has certain responsibilities but works closely in planning the following:

- Target clientele: Identifying target clientele and program objectives.
- Budget: Determining program materials, mailings, production, support staff, honorariums for speakers, people needed to make the program successful and arriving at a program fee.
- Promotion and publicity: Planning brochures, press releases, radio spots, feature stories, radio-TV appearances.
- Production timetable: Establishing pre-recording, telephone tie-ins, remote program origination, A-V materials, cassette packaging.
- Instructional approval: Obtaining department chairman and divisional dean's approval.
- Registration process involved.
- Evaluation instrument to be used.
- Program materials: Determining handouts, books required.
- Course format to be followed.
- Station selection: Serving statewide or certain locations.
- Program initiation request: Confirming the operational design; also the official contract between the programming department and ICS.

Program Announcement

A program announcement is prepared by the ICS program coordinator in conjunction with the program department to provide the local program administrator (LPA) and network coordinators with pertinent information about the program. A schedule card must be returned within a given time, usually two weeks, if the network facilities cannot be scheduled. The LPA determines location availability and uses the schedule card to inform ICS accordingly. From the schedule cards returned, a listing of confirmed locations is sent to the program department and the registration office, which keeps a checklist for location requests. The program department then completes its program brochure identifying specific network locations. The program announcement, with its approximate 60-day lead time, gives the LPAs and the programmer ample time to schedule and promote the programs properly.

Promotion

The promotional strategy for SEEN engineering courses has been largely based on direct-mail announcements. Approximately 20,000 people in Wisconsin and some engineers in Iowa, Minnesota, and Illinois, receive brochures. An internal mailing list is augmented by a few outside lists.

There are three types of direct-mailings: (1) an annual directory that lists all Engineering Extension offerings and describes the SEEN system and other instructional modes; (2) a catalog of EMPE courses (SEEN and various television formats), on a semester or annual basis; and (3) monthly-reminder brochures of upcoming programs, generally grouped in interest categories.

More general promotional vehicles also are used, such as the newspaper tabloid—an economical and convenient medium—prepared each semester by ICS

and the Program Information Office. It lists all programs by department and includes dates, times, fees, clientele, and a general description of each course. Newspaper ads and public service TV spots have been used on occasion.

Of growing importance to promotion are the local program administrators. Their local contacts with potential clientele have been increasingly effective in generating enrollments, and their efforts are enhanced by special news releases prepared by Extension's Program Information Office for distribution by the LPA in local news media.

Registration

Registration for SEEN engineering courses is conducted primarily by mail preceding the first program. Enrollment forms on the program brochures are addressed to the EMPE director who, after listing the registrants for each course, forwards the enrollments to Extension's central registration office, which processes the forms and deposits the enrollment fees in the programming department's account. Copies of the registration forms are sent to the registrant, the programming department, and to the local program administrator at the participant's location.

Production

Before the first program session, ICS staff contact the instructor to confirm the production format for the course. If an instructor is unfamiliar with network facilities and production capabilities, an appointment is arranged to demonstrate the equipment and explain the production process.

Production requirements for each program are written on a standard form and given to the network engineer for use at transmission time. Included are the locations participating in the program, origination site, tape inserts, dial-up telephone participants, and tape duplication services.

Programs on the SEEN system can originate at any of the network locations, but most engineering courses originate in Madison, Milwaukee, or Platteville, where the majority of faculty members are located. The programs may be produced live or prerecorded for later telecast.

In addition to the SEEN studio and regular monitor-control functions, other production services are available to faculty, including:

- *Faculty production lab*: A workshop area where faculty may use cassette and reel tape machines, turntable and telephone for convenient recording, editing and listening to program materials.
- *U-Tape-It studio*: A self-operated, push-button control studio in which faculty record lecturers and interviews.
- *Studio recording and editing*: A technician-controlled production service available for single-voice and multiple-voice recordings, such as for role playing and panel discussions. Editing assistance is also available.

- *Tape duplication:* Cassette and reel copies of programs available for purchase by faculty and students.

Instructional Design

An interactive telephone network such as SEEN is a unique instructional mode. Although it is similar in some ways to face-to-face teaching, there are important differences. Effective programming therefore requires that certain elements be incorporated into course content and teaching style.

The design techniques used in SEEN programs are based on 12 years of experience with Wisconsin's educational telephone networks and accumulated research in communications, adult education, listening, and learning theory. Workshops, printed materials and faculty consultations help SEEN instructors implement these techniques and use the network most effectively.

Four design elements are considered essential to interactive programs: personalizing the experience, varying the style of presentation, seeking participation from the statewide audience, and obtaining feedback.^{7,8}

Personalizing the experience helps students feel comfortable in the distant learning environment by creating a congenial atmosphere and group rapport. SEEN instructors usually adopt an informal teaching manner, allowing their personalities to come through. Frequent use of names and locations identifies participants. By emphasizing common objectives and the sharing of ideas and experiences, learners scattered throughout the state feel like part of a group.

Style of presentation involves many elements, all of which contribute to the goal of helping the learner understand and remember the material. A variety of illustrations presented on the electrowriter, such as drawings and graphs, amplify ideas and underscore key points. The visual development of equations accompanied by a clear, concise verbal explanation help the learner understand the mathematical relationships. Instructors often exploit the two-frame capacity of the electrowriter by reviewing the material previously presented, which contributes to the clarification and retention of ideas. Topic outlines, bibliographies, lists of resources available for self-study, and other hand-out materials distributed before the program help students organize the learning experience.

Participation, an integral part of interactive media like SEEN, does not occur automatically. Detailed class rosters, for example, are used to direct questions to those with specific engineering experience and training. At the beginning of a program, many instructors converse informally with students at different locations to "break the ice" and stimulate discussion.

Feedback enables both student and teacher to assess the learning experience, achieve program objectives and improve performance. Informal question-and-answer periods interspersed throughout the program show immediately how well the material is understood. Many instructors ask participants to send in questions and comments, others make periodic phone calls to their students. Individual or small group projects and written responses to specific questions are other means of obtaining feedback.

Evaluation

Evaluation is an integral part of the programming process that contributes to the overall effectiveness of the SEEN system and the quality of individual courses. Three types of evaluations are conducted for SEEN engineering programs: 1) system surveys of SEEN clientele at three-year intervals; 2) surveys directed to the participants in a particular SEEN course; and 3) spot evaluations to facilitate the critique and management of certain courses.

System Evaluation

The purpose of the system evaluation is to determine the strengths and weaknesses of current programs so that the program design can be improved. Evaluation results show the students' assessments of both instructional and technical elements. These results are analyzed by the program coordinators, educational specialists and individual instructors, and recommendations are incorporated into the design of subsequent programs. The system evaluation also provides peripheral benefits. For example, it functions as an additional channel of communication between the participants and the instructor, and it is a tangible sign of interest in student opinion.⁹

System evaluations of the SEEN engineering programs were conducted in 1974 and 1977 by survey questionnaires mailed directly to SEEN engineering clientele. Response was voluntary, resulting in a sample size of 282 respondents in 1974 and 244 in 1977.

The first part of the evaluation instrument included a series of items that provided a demographic profile of the SEEN student that has been useful in identifying future participants and in structuring programs for this particular group.

Some of the student demographic data is presented in table 2. The two surveys show little difference in any category except the degree of participation in SEEN courses. The number of respondents who are regular SEEN customers (defined by enrollment in more than one offering) more than doubled in 1977.

A statistic which bears on the justification for off-campus network programming is the distance traveled one-way to the SEEN classroom. Approximately two-thirds of the participants were within ten miles of course access both years. (An item added to the 1977 survey revealed that nearly two-thirds of the students were located more than 30 miles from a university campus with any technical curriculum, and one-third were more than 100 miles away.)

The acceptance of SEEN as a delivery system is indicated by the percentage of students who said they would participate in another course. In both years seven out of eight students responded affirmatively.

The second part of the evaluation measured student response to the engineering programs. It contained 30 descriptive statements related to the instructional and technical aspects of the courses. These items were classified into six general categories:

- 1) The functioning of the technical components of the programs, such as the audio network and electrowriter.
- 2) The lecturer's delivery of course material.

Table 2. Selected Demographics of SEEN Engineering Students.

1974 (N = 282)						1977 (N = 244)					
Number of Employees in Company	0-10 4%	11-50 16%	51-200 20%	200+ 59%		0-10 7%	11-50 20%	51-200 16%	200+ 55%		
Age of Respondent	20-30 31%	31-45 42%	46-60 24%	60+ 1%		20-30 25%	31-45 48%	46-60 26%	60+ 1%		
Percent of Tuition Refund by Employer	0-20 15%	20-40 2%	40-60 15%	60-80 11%	80-100 49%	0-20 16%	20-40 2%	40-60 14%	60-80 16%	80-100 46%	
Distance Traveled One-way to SEEN Site (miles)	0-2 14%	3-10 49%	11-30 27%	30+ 7%		0-2 18%	3-10 48%	11-30 24%	30+ 7%		
Have Participated in More Than One SEEN Course			19%					42%			
Would Participate Again in a SEEN Course			86%					83%			
Would Not Participate Again in a SEEN Course			10%					9%			

- 3) The course content and other program materials.
- 4) The arrangement of the physical facilities at the SEEN classroom site.
- 5) The program's organization and involvement of the participants in discussion.
- 6) The overall effectiveness of the system.

Each of the first five categories corresponded to a primary system objective and was evaluated by at least five descriptive items on the survey. One statement at the end of the evaluation asked for the participants' overall feelings toward the program. Responses to each statement were marked as a numerical rating along an ordinal scale as follows: 1—strongly agree (SD); 2—disagree (D); 3—neutral (N); 4—agree (A); and 5—strongly agree (SA). The data collected were analyzed to derive the mean, percentile and standard deviation for each category and the individual items. Their reliability, quality, and predictive power were measured by a MER-MAC computer program.

The respondents' evaluation of the engineering program is summarized in table 3. There is little difference in the mean values of each category for the two surveys. The data collected in 1977 show a slightly higher level of satisfaction with the instruction (lecturer, material, organization) and slightly lower rating of the physical aspects of the system.

Table 3. Evaluation of SEEN Engineering Programs.

<i>Category</i>	<i>1974</i>		<i>1977</i>	
	<i>Mean</i>	<i>Reliability</i>	<i>Mean</i>	<i>Reliability</i>
Technical	3.78	.77	3.65	.74
Lecturer	3.58	.84	3.67	.80
Material Presented	3.59	.70	3.69	.84
Facilities	4.12	.58	3.80	.62
Organization	3.55	.80	3.66	.77
Total, All Items	3.73	.92	3.69	.93
Overall Effectiveness	3.69	—	3.73	—

Individual Course Surveys

Whenever the enrollment in a SEEN engineering course exceeds 55 students, (which may happen once or twice a year), a survey somewhat different from the system evaluation is used. Results have been strikingly similar to the system survey results. The value of such individual evaluation in the critique and adjustment of the course instruction is substantial. For the individual course survey a number of questions peculiar to the subject are included.

Table 4 shows the summary results of a 40-question survey designed specifically for a new course. Items scoring below 3.5 are candidates for refinement.

Table 4. Summary of Single Course Survey.

<i>Category</i>	<i>Mean</i>	<i>Reliability</i>
Technical	4.16	.48
Lecturer	3.74	.67
Organization	3.52	.62
Knowledge	3.10	.71
Competency	3.13	.76
Content	3.67	.82
Total Overall	3.59	.92

Spot Evaluation

When the size of a class is so small as to reduce the statistical significance of the response, a standard evaluation form is distributed. The return in this category may be computer-processed, as are the other types discussed above, but are more likely to be "hand-processed." These spot evaluations are particularly valuable for first-run courses with fresh instructors, new topical material, or where attendees appear to be distinctly different from the ordinary class. These evaluations often are deployed in response to random participant feedback that calls for substantiation. Many instructors routinely distribute and collect these responses for their own use.

Costs of the System

The costs of the SEEN system include those for administration, promotion, printed handout materials, instructional fees, line costs, engineering equipment maintenance and a variety of support services such as those involved in conducting surveys, faculty training and local site coordination.

The university costs of the SEEN engineering program in 1977 were approximately \$60,000, with about half being spent on instructional costs and half on network operation. Income from student tuition amounted to some \$30,000, placing the current self-support level at 50 percent. Continually improved program management and market development might make the program 60 percent self-supporting during the next several years.

Costs in higher education are usually evaluated by two approaches: 1) cost per student contact hour, and 2) cost per continuing education unit. Using the first approach, the SEEN engineering program costs about \$17 per student contact hour. In 1977 some 550 students were enrolled in courses with 460 instructional hours at a total university cost of \$60,000 ($550 \times 460 = 253,000$ student contact hours $\div$ \$60,000 = \$17). Using the total number of 18,072 CEUs earned in SEEN engineering courses, the cost is about \$33 per CEU. A comparison between the cost per CEU of SEEN instruction and other delivery formats is shown in table 5.

Table 5. Cost Comparison of Continuing Engineering Education Formats, 1977.

<i>Format</i>	<i>Methods Used</i>	<i>Clientele Served</i>	<i>Avg. No. of Students/Yr.</i>	<i>Level and Scope</i>	<i>University Cost: Dollar/Student CEU</i>	<i>Student Cost: Dollar/Student CEU</i>
Correspondence study (worldwide)	Self-study with study guides and some audio-visual aids	Students remote from campus	1,800	Mostly undergraduate. Usually general interest topics. Seldom enough demand to justify advanced specialized topics.	\$14.00	\$8.25
Institutes and short courses (Madison & Milwaukee)	Lectures and workshops	Practicing engineers and technical management	12,000	Highly applied. Generally state-of-the-art.	\$85.00 (institute) \$75.00 (short course)	\$100.00 \$75.00
SEEN (statewide)	Electrowriter network	Very broad range	550	Applicable to wide range from college courses to single-topic state-of-the-art.	\$33.20	\$20.00
Video cassette courses (worldwide)	Study guides, Video Lessons	Students & Practitioners on & off campus	1,000	Same as SEEN. No Interaction.	\$16.00	\$16.00
Evening classes (Milwaukee)	Lectures and labs	Working students, sometimes without company financial support	775 177	Often similar to college courses. Usually more applied. Some state-of-the-art programs.	\$35.00	\$30.00
University campus courses (Madison)	Lectures and labs	Resident students, part-time students employed locally	2,600	Generally aimed at resident campus students; continuing engineering students can enroll.	\$22.50 (undergrad.) \$41.25 (grad.)	\$5.50 \$12.25

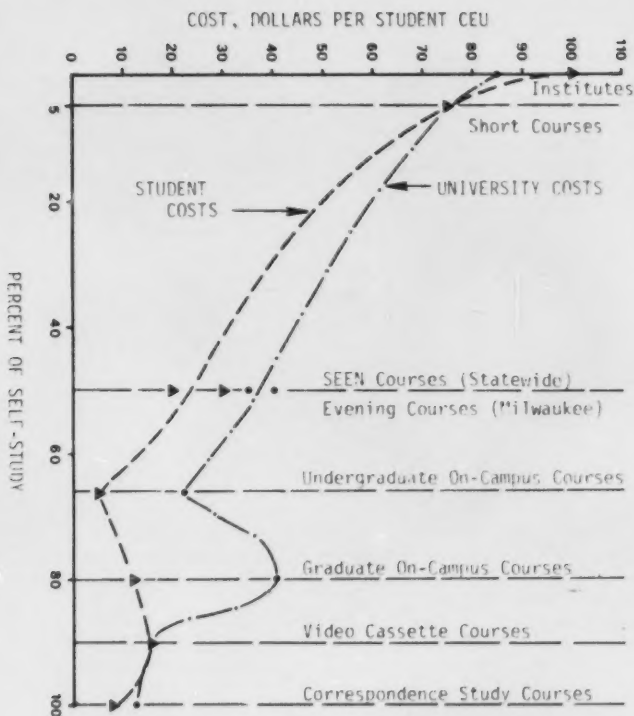


Figure 5. Relative costs and self-study.

Looking at cost data by relating student and university costs to the percentage of "self-study" required of the student to participate in a particular type of instruction, figure 5 clearly indicates a decrease in cost as the self-study component increases. The figure also shows the effect of management to bring student and university costs together, whereas the on-campus difference for public instruction is quite pronounced.

There are other student cost benefits difficult to estimate: those cost savings for travel between business and campus as opposed to SEEN locations in a total community. The surveys in 1974 and 1977 showed, as in the case of other formats such as Institutes and Short Courses, a great deal of the continuing engineering students' direct expenses are often refunded by their employers.

The Future of the Telephone in Education

The telephone has served Wisconsin well in extending education opportunities to engineers and others throughout the state. The teleconferencing networks have increasingly grown in number of enrollments, programming hours, and variety of

The Latest Equipment

The future of the telephone in education depends not only on its effectiveness as an audio medium but also on its capacity to provide a high quality of visual information. This consideration is especially important in technical fields like engineering where instructors often present mathematical and graphic material. Recently introduced telewriting and televideo systems have great potential in education. A variety of graphic and pictorial information can be presented over regular telephone lines using improved electro-mechanical pens, graphic tablets, video writers, electronic blackboards, computer-graphics systems, or slow-scan televideo systems. Some of these devices and their manufacturers are summarized in table 6.

Electro-mechanical pens that write on paper-covered surfaces, such as the Victor Electrowriter, are probably the oldest of the telewriting systems, entering the market of telephone technologies in the early 1960s. Since then, their resolution and accuracy have greatly improved. Their relatively low cost also makes these devices attractive for transmitting hand-drawn graphics—equations, line drawings, outlines, diagrams, graphs.

Graphics tablets, video writers and the electronic blackboard are similar in a number of ways. Hand-generated material is accurately reproduced by writing directly onto conductive surfaces. Graphics tablets usually have electronic grids or specially coated transparent sheets that sense pen movements. To produce graphic material on a video writer, one writes directly onto a TV monitor with a light pen. Ordinary chalk is used to present information on the pressure-sensitive electronic blackboard made by Bell Laboratories. The Electronic Blackboard has been tested in continuing engineering education for a number of years at the University of Illinois at Urbana-Champaign. All of these systems digitize the information and display it on monitors at remote locations.

Computer-graphics systems are capable of showing both written material and computer-generated graphics. A graphics tablet is used for hand-drawn information. In addition, these systems are programmed to perform various computer graphics, such as constructing bar charts and diagrams. Some have programmed symbols that can be instantly placed at any point on the televised display. These symbols may be mathematical or simple figures that can be animated to show, for instance, an airplane flying through a cloud or a person walking. Many firms have lines of computer graphics systems or will design packages especially to meet the user's needs.¹⁴

Slow scan televideo systems add another dimension to telephone instruction—the capacity to present pictorial information as well as graphics. Any image that can be captured by a video camera can be shown on a televideo system, including views of the instructor and classroom, outdoor scenes, written and prepared material. The picture is transmitted over the telephone lines during a number of seconds and shown as a frozen image on a remote TV monitor. Past systems were quite limited, used mainly for security-surveillance operations. However, the recent application of electronic technology has greatly improved their performance and versatility.

classes offered. This expansion is expected to continue as more and more adults seek off-campus programs for professional development and personal growth.

Supporting the Wisconsin experience are many studies that show the telephone to be an effective, inexpensive educational medium. Rao and Hicks,¹⁰ for example, reviewed 18 experiences in teaching by telephone and concluded that students learn as much or more in telephone classes as in face-to-face discussion. Similar conclusions were drawn by Hoyt and Frey,¹¹ Pellett,¹² Blackwood and Trent,¹³ and many others.

The new telewriting and televideo systems provide additional flexibility for visual instruction over a telephone network. Combined with its proven effectiveness as an interactive audio medium, the telephone can play a unique role in education—a role that extends teaching resources to adult learners in many distant locations.

Table 6. Selected Telewriting and Televideo Systems.

<i>Capability</i>	<i>Device</i>	<i>Manufacturer</i>
Hand-drawn graphics	Electro-mechanical pens	
	Telescriber	Telautograph Corporation
	Telenote/Telescreen	Talos Systems, Inc.
	Electrowriter	Infolink Corporation
	Graphic tablets	
	Audiographic Systems	Interand Corporation
	Graphic Tablets	Tektronix, Inc.
	Intelligent Digitizer	Summagraphics
	Cybergraphic Systems	Talos Systems, Inc.
	Video writer	FOR-A Company, Ltd.
	Electronic blackboard	Bell Laboratories
Hand-drawn graphics and computer-generated graphics	Computer graphics systems	
	Telestrator Electronic Graphics Systems	Interand Corporation
	Interactive Graphics Systems	Tektronix, Inc.
Hand-drawn graphics and video pictures	Slow scan televideo systems	
	Phone Line Television Systems	Robot Research, Inc.
	Narrowband Video Systems	Colorado Video, Inc.
	Telephone Video Systems (monochrome and color)	NEC-America, Inc.

REFERENCES

1. Holmberg, B., *Distance Education: A Survey And Bibliography*, Kogan Page, Ltd., London, 1977.
2. Parker, L.A., "Teleconferencing As an Educational Medium: A Ten Year Perspective from the University of Wisconsin-Extension," *The Status of the Telephone in Education*, University of Wisconsin-Extension, Madison, Wis., 1976.
3. Klus, J.P., et al., *Continuing Education for Engineers: A Case Study of the University of Wisconsin-Extension Engineering Department*, UNESCO International Working Group on Continuing Education of Engineers, UW-Extension, Madison, Wis., 1974.
4. Parker, L.A., M.A. Baird, and D.A. Gilbertson, "Introduction to Teleconferencing," *The Telephone in Education* (Book II), UW-Extension, Madison, Wis., 1977.
5. Braun, D., D.A. Gilbertson and H.C. Hansen, "ETN: A Technical System," *The Status of the Telephone in Education*, UW-Extension, Madison, Wis., 1976.
6. Seaman, M., "Operational Aspects for Program Planning," *The Status of the Telephone in Education*, UW-Extension, Madison, Wis., 1976.

7. Baird, M.A., "Designing Teleconference Programs: Some Clues from the Wisconsin Experience," *The Status of the Telephone in Education*, UW-Extension, Madison, Wis., 1976.
8. Monson, M., "A Report Investigating Teaching Techniques Used Over the Educational Telephone Network at the University of Wisconsin-Extension," *A Design for Interactive Audio*, UW-Extension, Madison, Wis., 1977.
9. Parker, L.A., *op. cit.*, ref. 2.
10. Rao, P.B., and B.L. Hicks, "Telephone Based Instructional Systems," *Audio-Visual Instruction*, vol. 4, no. 18, 1972.
11. Hoyt, D.P., and D.W. Frye, *The Effectiveness of Telecommunications as an Educational Delivery System*, Kansas State University School of Education, Manhattan, Kans., June 1972.
12. Pellett, V.L., *The Comparative Effectiveness of the Educational Telephone Network and Face-to-Face Lecturers for University Extension In-service Training*, unpublished doctoral dissertation, the University of Wisconsin, Madison, Wis., 1970.
13. Blackwood, H., and C. Trent, *A Comparison of Face-to-Face and Remote Teaching in Communicating Educational Information to Adults*, Kansas State University, Cooperative Extension Service, Manhattan, Kans., October 1968.
14. Machover, C., M. Neighbors and C. Stuart, "Graphics Displays: Factors in Systems Design," *IEEE Spectrum*, vol. 14, no. 10, October 1977, pp. 23-27.

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Lorne A. Parker is director of Instructional Communications Systems at UW Extension, where he heads three major statewide communications systems that provide continuing education. A member of the Wisconsin faculty for the past ten years, he played a significant role in the development and operation of university communications systems to take education to the people. Parker did his doctoral research at Wisconsin in mass communications and adult education, with specific focus on compressed speech. He has M.A. and B.A. degrees in radio, TV and film communications. Author of several books and numerous articles, he has served as a consultant to many telecommunications projects.

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visual systems for narrowband telecommunications channels, electronic digital technology, signal processing techniques and media mixes. She holds a master of education degree with majors in adult continuing education and sociology, and a B.A. in English.

Centex, a two-way telecommunications system operating out of Williamsburg, is proving a pacesetter in the inservice training of teachers and administrators. State educators see it as an impressive and effective means of increasing instruction at all levels.

Centex

Instruction Is a Two-Way Street

During the spring of 1978, 164 teachers and administrators in the Williamsburg-James City County and York County school divisions regularly arrived at their schools and offices an hour early in the mornings or remained there an hour after closing time. Why?

They were attending unusual inservice training sessions in special education. From 10 different locations that were 15 to 20 miles away from their instructor, they could see the instructor clearly and could ask questions and receive answers as quickly as if they, their fellow "students," and the instructor were all in the same room.

The two-way teaching-learning arrangement was made possible by a special telecommunications system operated as the Center for Excellence, Inc., (Centex) at the College of William and Mary's Phi Beta Kappa Hall. The instructor spoke from the hall; the students, at their various locations, saw and heard him on their television sets and spoke to him through microphones. At each location, students could hear each other's questions and answers as well as their own.

The Centex operation, called Project SETT-UP: Special Education via Television—Teacher Upgrade, included six different courses, each requiring attendance at 16 one-hour sessions. Courses were broadcast on sequential schedules so that participants could take more than one course if they liked.

"Classrooms" were located in two private schools—Walsingham and Jamestown academies; the children's division of Eastern State Hospital; Magruder Elementary School in York County; and six schools in the Williamsburg-James City School Division.

Project SETT-UP has 12 full-time and 48 part-time faculty members and technicians. It operates on a \$425,000 budget, of which approximately \$125,000 is provided by the state and the rest by

the federal government.

At the conclusion of the spring program, 88 percent of the participants reported that they found no difficulty in receiving instruction through telecommunications, and more than 90 percent said they felt that television holds real promise as a means of training. On the strength of such favorable results, seven additional one-hour courses in



Centex's fixed TV station, located in Phi Beta Kappa Hall at the College of William and Mary, uses low-power transmitting equipment and is easily and effectively operated.



Teacher Susan Geller's demonstration for mothers of high-risk children is carried to homes or community centers 10 to 15 miles away. A mobile station transmits responses back to the teacher.

special education—one carrying college credit—are being offered through Centex this fall.

When Centex is not being used for training in special education, it serves other purposes. It is used to deliver two-way televised programs to unwed teenaged mothers at community centers, to parents with high-risk children, and to temporarily and permanently homebound, school-aged children. A mobile unit, the first to be licensed by the Federal Communications Commission, carries Centex programs into individual homes.

Centex, an instructional television fixed service system, is also broadcasting services to the visually impaired by means of special audio receivers; to the hearing impaired by means of teletype; to the deaf-blind through the use of braille machines; and to the elderly handicapped through the use of audio receivers.

The Centex operation has already outgrown the Phi Beta Kappa offices, occupied since June 1976 at the invitation of the college, and administrators recently completed an agreement with Christopher Newport College and the Newport News School Division for the establishment of an antenna site and offices in that area. A Centex station is being built in Newport News so that courses similar to those originating in Williamsburg can be channeled to all schools in the peninsula. Plans are also being developed to extend Centex services to rural and other populated Tidewater areas.

If the current support and quality of programs are maintained, Centex will carry its services throughout the state. Administrators are currently seeking funding to determine the usefulness of satellite circuitry for a comprehensive, statewide educational network.

Founded six years ago by John A. Curtis, chief operations officer, Centex became the country's

first educational telecommunications laboratory for the study of television's usefulness in the delivery of services, operational requirements, cost effectiveness, and the techniques available to meet educational needs. Also, through Centex, Mr. Curtis hopes to train teachers in the use of educational telecommunications and to extend the distribution and availability of various educational offerings.

In February 1976 the General Assembly requested the Department of Education and the Virginia Public Television Council to review Centex's educational and research findings. The educational analysis became the responsibility of the department's Division of Special Education Support Services, headed by James T. Micklem, director. As a result of Mr. Micklem's recommendations, two presidents of the Board of Education (Vincent J. Thomas and his successor Henry W. Tulloch) and Superintendent of Public Instruction W. E. Campbell and his staff have supported the Centex program.

At the end of Project SETT-UP's spring semester, educators interested in or involved with the project were asked to evaluate the teacher training program and broadcasting system. Following are some of their comments:

- Mr. Tulloch—"With decreasing enrollments and the need to reduce expenditures and possibly the number of open school buildings, it is most important that the costs of education be kept commensurate with the public's need for its services. One way to maintain the distribution, scope, and quality of public education is to make maximum use of two-way telecommunications delivery systems, such as those which Centex has in operation in Virginia's peninsula area."

- Donald S. Bruno, superintendent, York County Public Schools—"Two-way instructional telecommunications has enabled us to accomplish educational goals which we have never before been able to realize. We can now deliver need-based instructional programming from a central location and deliver it simultaneously to two or more remote locations at times which meet teacher needs and convenience. Thus, we can multiply the productivity of our best instructors and make broader

use of their expertise and materials."

• Dr. Henry Renz, superintendent, Williamsburg-James City County School Division—"The Centex system enables us for the first time to deliver teaching expertise and materials to the classrooms at times convenient to both teacher and pupil. The circuit is always two-way (audio-video) out, and can be either one-way (audio) or two-way (audio-video) back, depending on curricula and teaching strategies and requirements."

Commenting on future developments in the field of educational television, Dr. Carl L. Riehm, assistant superintendent for curriculum and instruction, said:

"The primary use of educational television in Virginia is currently enrichment. The future may find a combination of enrichment and direct teaching.

"Local classes are today being taught in Virginia by colleges (William and Mary and Christopher Newport) over a two-way television project through the Center for Excellence, Inc., (Centex) in Williamsburg. It may soon be possible for a college at one end of the state to be teaching a class at the other end of the state without the need for the professor to travel."

In his own observations on the future of educational television, Mr. Curtis observed that, to date, intensive use of telecommunications provides the means "by which the productivity of the individual instructor can be increased significantly."

And, he added, only by increasing such productivity at all levels of instruction can the state meet increasing educational demands.

Mr. Curtis expressed hope that the Virginia Telecommunications Study Commission, established by the General Assembly, "will call on its colleagues to rule—very clearly—that the selection of educational media and the content (curricula) delivered through the media is the responsibility of those groups directly charged with educational duties." In most states, he noted, educational responsibilities fall upon a number of independent agencies. Virginia has 19 such state agencies that report to four cabinet-level offices.

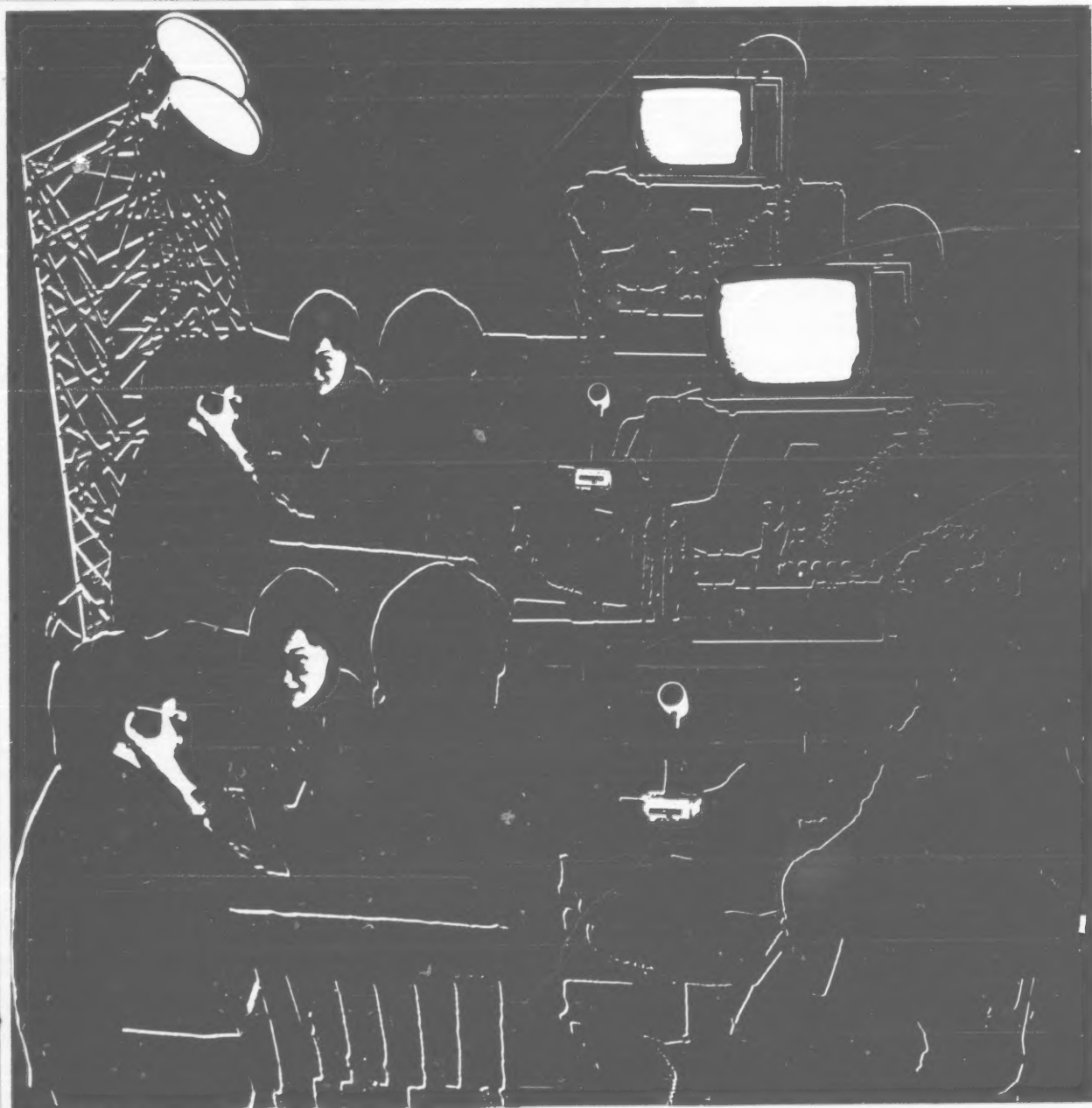
"Since Centex has demonstrated that it has the critically needed know-how," Mr. Curtis continued, "we hope the commission will recommend that Centex and its half-million-dollar research assets be established by the state as either a state or quasi-state organization, managed, as Centex already is, by an interstate agency board of directors."

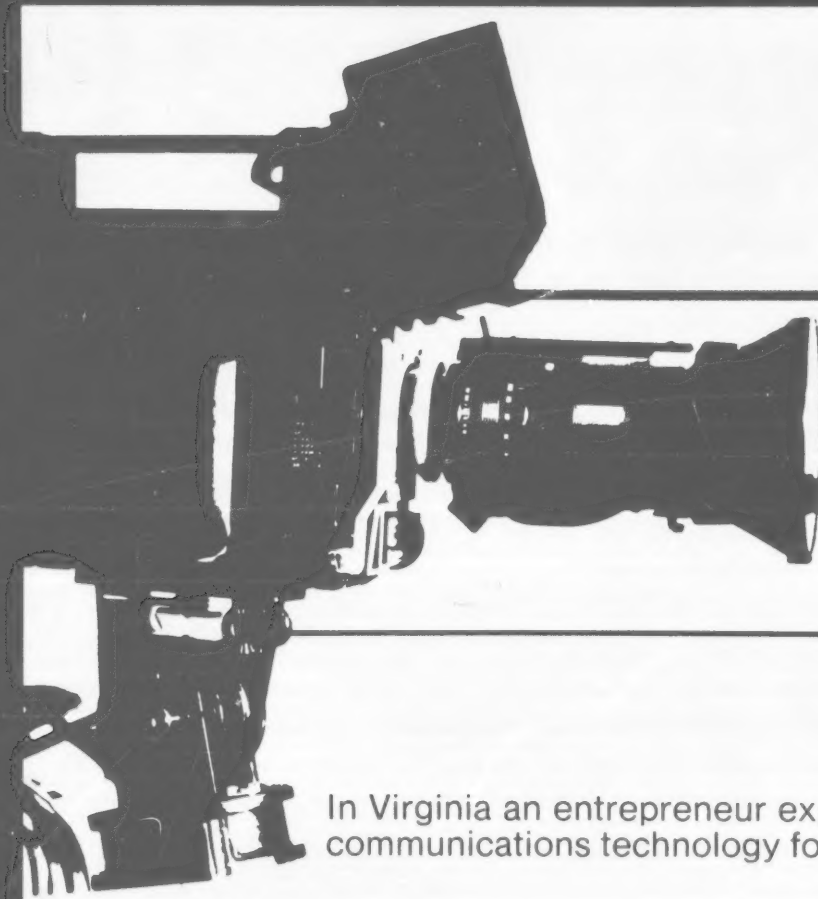
Centex's Board of Directors includes representatives of state agencies (and privately supported counterparts) with major educational responsibilities; representatives of every major state agency concerned with physical and mental health and with services to the handicapped and other special groups; and representatives of interdisciplinary skills and experience critical to research, systems operation, and resource development in educational telecommunications. ■

AMERICAN EDUCATION

UNITED STATES DEPARTMENT OF EDUCATION NOVEMBER 1980

REPRINTED FROM
**AMERICAN
EDUCATION**
MAGAZINE
U.S. DEPARTMENT OF EDUCATION





Two-Way TV Trains Teachers

In Virginia an entrepreneur explores the margins of communications technology for public benefit

The lecturer, a recognized authority on the education of gifted children, is in a television studio in Williamsburg. His students sit in classrooms in five school districts in Virginia—Hampton, Newport News, Poquoson, Williamsburg—James City—County, and York County.

The students, classroom teachers all, watch an ordinary looking television set, listen, and take notes. As the lecturer concludes his talk, he invites questions. The first comes from a teacher in Hampton, and 300 fellow teachers listen as she describes a 12-year-old Virginian in a small Tidewater town who needs more help than she knows how to give to become, perhaps, a scientist or doctor.

As the questions go on from all five districts, the lecturer responds with advice, elucidation of theory, sympathy, and understanding.

The lecture described above was part of an inservice training program to prepare teachers to recognize and respond to the special education needs of gifted or handicapped children. The teachers watched, listened to, questioned,

and exchanged ideas with 15 top experts in the field, and they never left their schools.

The lecture series for the gifted, and another series targeted for teachers of the handicapped (often the same teachers), was a large-scale experimental test of an interactive (two-way) telecommunications network. Five districts are now being reached but more are on the way, and it is hoped the system will one day cover the entire state.

It was a test not only of electronic equipment but of the planning, preparation, and creativity involved in employing modern telecommunications in the complex process of teaching and learning.

The results were encouraging. Evaluations showed that the participating teachers welcomed the new system and wanted more. Most important, the evaluations also showed that the teachers gained significantly in their knowledge of handicapped and gifted students and in how to carry out their increasingly heavy assignments as teachers of *all* children.

The new network owes its birth and growth to the collaboration between the U.S. Department of Education and the

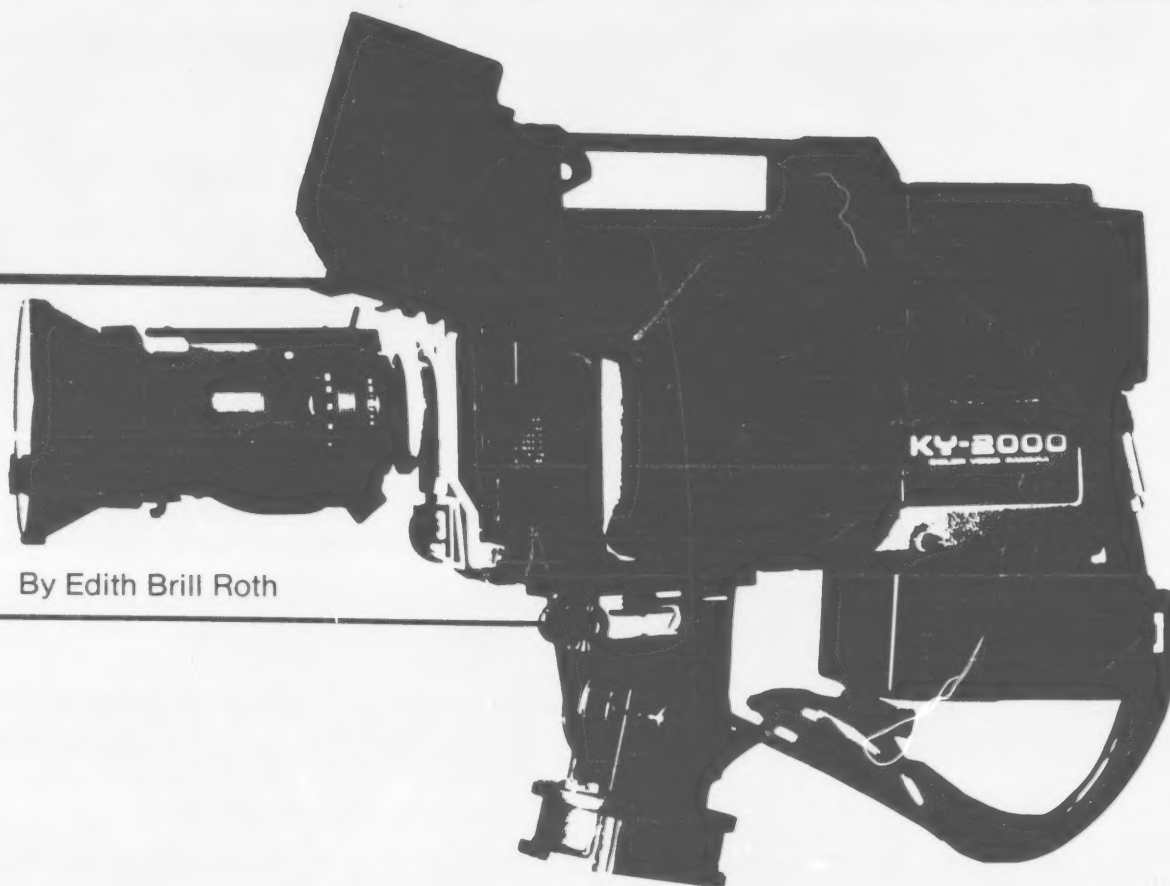
Commonwealth of Virginia Department of Education, initiated by the telecommunications genius of John Curtis, president of Centex (the Center for Excellence), the first nonprofit telecommunications research laboratory.

A needs survey conducted by Centex in the first school districts showed that only 11 percent of teachers with gifted children have course credits in the growing field of teaching the gifted. All teachers surveyed requested additional training, as did the parents in the same districts.

So, early this year 300 teachers in five elementary schools enrolled in a course of 15 lectures, one a week, presented by authorities they had all heard of—whose books they may have read but whom most had never hoped to have as teachers.

The lecturers in the studio see and are in direct contact with one classroom 20 miles away. Teachers in four other distant classrooms hear and see the lecturer and can ask questions over conference telephone circuitry.

Bonnie Riskin, the teacher for the gifted at Berkeley Elementary School in Williamsburg, thought that the 15 experts lined up as lecturers were “fan-



By Edith Brill Roth

tastic, they could not have been better." Some of the material was not new to Riskin, since she was one of the few trained to teach gifted children, whereas the majority of the teachers were seeing the material for the first time.

"Each expert has a particular theory," says Riskin, "and so many theories may be a little confusing to classroom teachers who look for a practical approach. But in general the system works well because the teachers do not have to travel to a classroom, and they can ask questions." Riskin's overall reaction was favorable.

Nuts and bolts—how it's done

The inservice training for teachers of the gifted (Project GETT UP—Gifted Education via Telecommunications: Teacher Upgrade) comes over a two-way Instructional Television Fixed Service (ITFS) channel, one of 28 nonprofit educational channels in the 1500-2690 megahertz band set aside by the Federal Communications Commission.

The two-way system permits the instructor in the studio to see and hear participants at one receiving schoolroom through the use of a television transmitter on a mobile van that carries the picture and audio from one schoolroom

to the other four schoolrooms keyed into the course. The student-teachers in four of the five classrooms can dial a studio number and ask a question of the instructor, while the fifth classroom—the one the instructor is seeing—can ask direct questions. The questions in every case become part of the audio transmitted. Since the transmitter is on a mobile van, each of the five classrooms is a camera in turn, a different one each week.

Training teachers of the gifted

For the first course, school districts sent notice to teachers and administrators in the various schools. Centex sent out a catalog listing the lecturers and subjects and supplied a bibliography. The teachers registered to attend. Those who were taking the material for certification did not have to do homework, but a bibliography and materials were suggested for those seeking college credit from the College of William and Mary.

The course was composed of lectures given by 15 experts who have sprung into prominence in as many years in a new field. As a result, each lecturer explained in some detail the particular theory he advocated on the identification

of gifts and talents, and the complexities of course acceleration for genius-level minds or multi-talented children.

Dr. Harold C. Lyon, director of the U.S. Education Department's Office for Gifted and Talented, opened the series with general information on the gifted and how curriculums should be adapted to them. William C. George of Johns Hopkins University spoke of the identification of mathematically precocious young people, and of tests and measurements; Dr. C. June Maker described identification of the handicapped gifted. Creativity and ways of developing divergent thinking was covered by Dr. Frank E. Williams of Macalester College; Dr. Abraham Tanenbaum of Columbia University emphasized the importance of role model contact for the gifted child. Dr. Joseph Renzulli, a widely known expert in the field, described an enrichment model for the gifted and explained his widely recognized formula for identification: intelligence, creativity, and task commitment.

Technically speaking

The ITFS channels used by Centex are converted to standard VHF channels on ordinary television sets by means of



a downconverter. In this way the economy of "open" broadcast with multi-point delivery is combined with the privacy associated with a closed-circuit (wired) system. Downconverters are not generally available and only authorized parties are permitted by law to receive the telecasts. (The FCC considers the ITFS service to be covered by the privacy provision of the Communications Act of 1934, making unauthorized interceptions of ITFS signals subject to the same federal felony penalties as telephone tapping.)

Programs originate from studio facilities inside the school auditorium of the Berkeley Elementary School in Williamsburg, where there is equipment for color television production and recording. From there the signals go to the main transmitting stations (the Williamsburg, Newport News, and King William County antenna towers) and from there are transmitted to points within their respective coverage areas, each of which extends over a radius of 20 miles from the transmittal point. The Williamsburg station has been operating three years, the Newport News station two years, and the King William station formally opened in August 1980.

The Newport News tower uses the services of Warner Cable Television for retransmission. For this reception the receivers in the area schoolrooms have had to be fitted with cable decoders. It is the hope of the Virginia Department of Education that it will soon be possible to use a satellite to expand coverage.

There are nine operating receive/transmit sites (classrooms, in this case) in Williamsburg—James City—County and in York County, served by the Williamsburg fixed station. Six sites are installed in other parts of York County, Poquoson, Newport News, and Hampton, served by the Newport News station. The number of receive sites available for reception of the Gifted and Talented Inservice Teacher Course is 15, with more individual sites planned by the school districts. If all teachers at those receive sites were participating in courses, there would be an audience of 4,400.

The Williamsburg site

The Williamsburg studio is used for transmission of the course for teachers of the gifted. John Curtis, president of Centex, also has his offices on the Berkeley School grounds, and a small staff spread among a number of small build-

ings. "We will work only with schools that give us a 20-year contract," says Curtis, "and that includes heat, light, and land for the antenna. In return we make available to the school any program we transmit, and in addition they have use of our station for any purpose."

The Berkeley School is also the place where Dr. Henry Renz, III, superintendent of schools for Williamsburg, has his offices. Renz, the first to offer the school's facilities to Curtis, explained why he was so happy to welcome the new network. "We have been disenchanted with the usual education television," he said, "and usually used it as a babysitting device, something to keep the interest of the kids while teachers might be out of the classroom for a short period. Yet it was not inexpensive; in Virginia the school district pays what amounts to a head tax for educational television, something like \$2 per student, and many

sets in the secondary schools are not in use because the scheduling is too tight. So we were not happy with what was offered in the name of educational television for schoolrooms.

"On the other hand, we have received \$150,000 in grants as a school system for activities with Centex, for teacher training, and for hardware to develop facilities and studios. Tied into the Centex system are seven schools—five elementary and five secondary—and a program for Eastern State Hospital, a mental institution for children and adolescents."

The lecturers came to Williamsburg, and with the help of Joan Byrne, director of gifted programming for the York County schools, worked out the sequence of their presentations. Videotapes of their performances were shown each lecturer the same day, and with the assistance of Dr. Denise de Wald of Centex, a special education expert, the tapes were edited

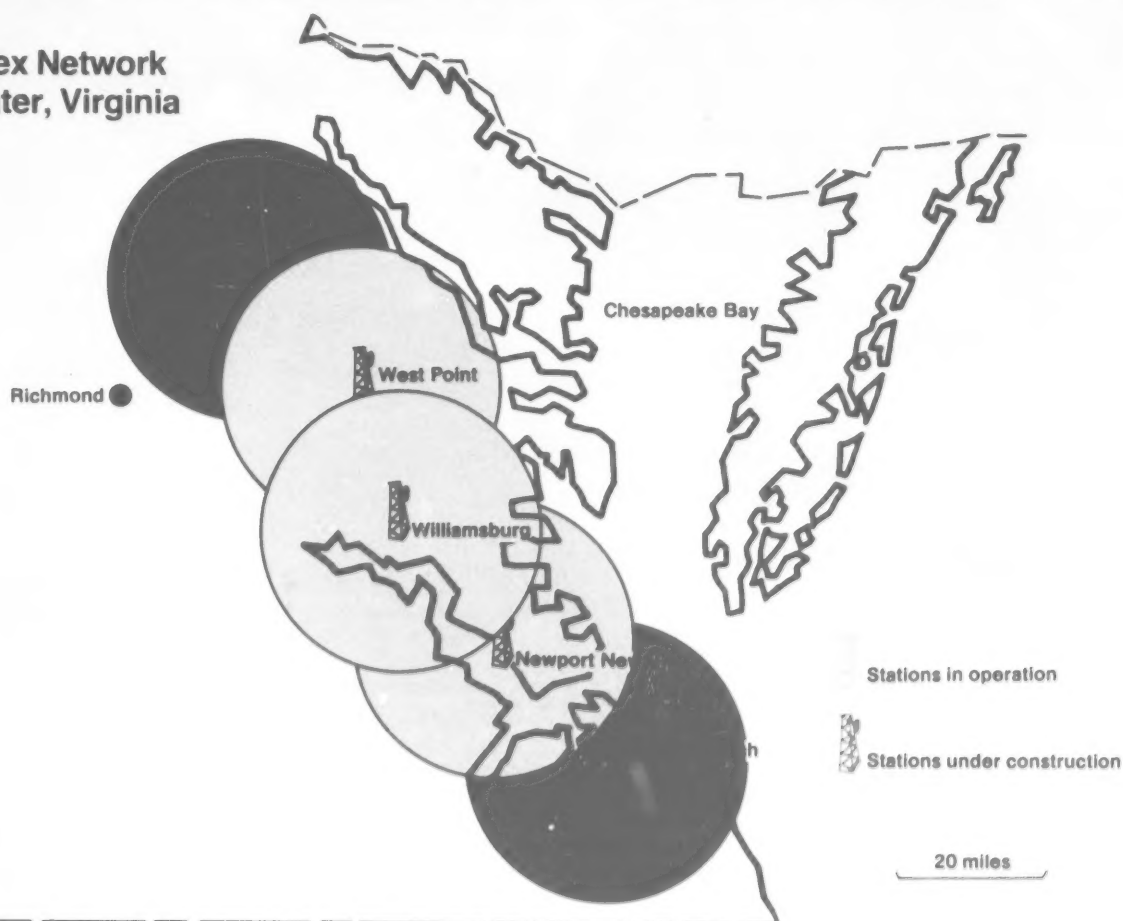
for use. De Wald subsequently did a final edit on the tapes, included written materials, and sent them on to several schools within the area for field testing. After the schools offered their comments, adjustments were made on the tapes and they were made available for use in schools that were not as yet within the broadcast area.

The man behind the network

John Curtis, the founder and chief operations officer of Centex (the Center for Excellence), looks upon the establishment of Virginia's new educational network as his retirement activity after an extraordinary career.

Born to a poor family in Rio, New York, John and two little girls were singled out from 23 pupils in the one-room school he attended for enrichment with special books that his teacher, Ethel Palmer, picked up on her trips to the

The Centex Network in Tidewater, Virginia



New York City libraries. The books, along with insights from Palmer, enabled Curtis to breeze through fifth, sixth, seventh, and eighth grades in two years and earn a scholarship to the Lawrenceville School in New Jersey. From there he went on to other scholarships that, along with jobs, enabled him to go to Yale University.

His career shows a long and steady ascent through work in all the media, including publishing, motion picture and theater management, production and distribution, and on into electronics, communications, and computer systems. Along the way he pioneered several firsts, such as the first railroad radio-telephone system (New York to Chicago, 1945-47, Erie Railroad).

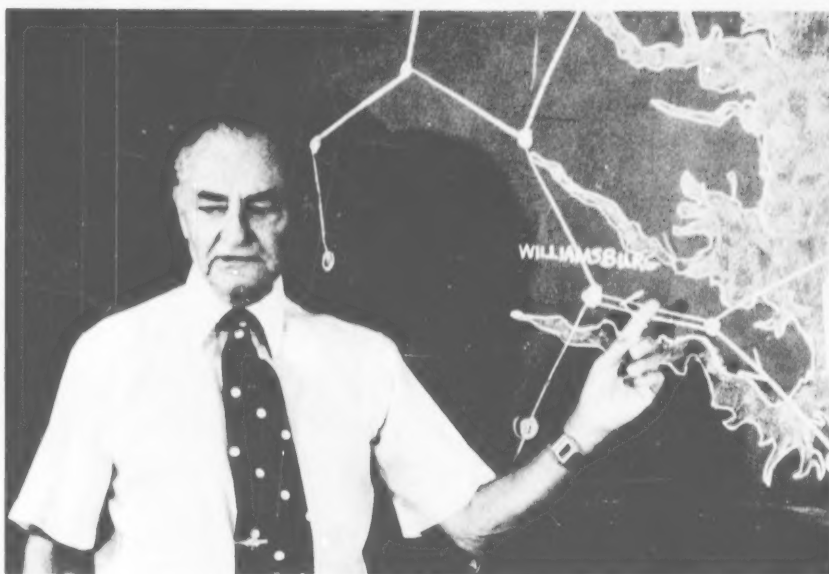
In 1976, at the age of 69, Curtis started to think about the heritage he would leave. "I decided," he said, "that one of the objectives during my retirement was to repay the debt I owed Ethel Palmer and society."

In 1968 Curtis wrote two papers which led to his appointment to a committee set up by the Joint Council for Educational Telecommunications established at the request of the FCC, and this in turn put him on the Educational Technology Committee of the National Academy of Engineering. Experience on the committees brought him to feel that there would be "no well educated middle class in the future unless we could break the shackles of time and distance which were significantly causing the spiraling rise in educational costs."

He first tried to persuade those in the public broadcasting industry in Virginia to back up his ideas, but they declined. At that point Curtis decided to go it on his own, forming Centex and the Institute for Learning Science and Teaching Technology, a research organization.

Curtis and some friends then spent a combined kitty of \$75,000 searching for an operational laboratory that would be a "microcosm of American socioeconomic life" and found that the Tidewater area of Virginia fitted the description.

The College of William and Mary provided the group with its first home. Members of the faculty contributed their own time to help establish the center. The telecommunications research that the center engaged in came to the attention of the Virginia Assembly in 1975, which passed a resolution asking the state department of education and the Virginia Public Television Council to



John Curtis, founder and president of Centex, a nonprofit telecommunications research organization, began exploring the social uses of telecommunications technology as a retirement activity after a successful business career. He has designed systems for telecommunications with handicapped persons and for long-distance medical consultation, as well as the educational system he hopes to see extended to the entire state.

validate the research and make recommendations as to its usefulness to the state.

On the basis of favorable reports, including those from the Bureau of Education for the Handicapped of the U.S. Office of Education, Centex got its first BEH grant of \$125,000. "In this way," says Curtis, "BEH has helped us establish the first educational network that enables two way communication between teacher and student, one that uses radio as well as television and variations on those systems. The network has a future as a vehicle for medical diagnoses and instruction, for broader adult education, and for meeting a wide variety of social service needs at low cost."

Curtis adds that none of his friends on his board of directors—and they are all people distinguished in educational fields—has made or expects to make a penny out of the development of the system.

Other uses of the system

Curtis is not content merely to train teachers. In 1978 he pioneered a service with the help of BEH to pull out of isolation three types of handicapped persons: the blind-deaf, those born either deaf or blind and later, those who were homebound because of permanent damaging illness.

Through the use of a subcarrier super-

imposed on an FM radio channel—the first time it had been done—80 or 90 handicapped people living within a 20-mile radius around Williamsburg are able to receive special news and features during certain hours of the day.

The visually-impaired have special audio receivers connected to their radios through which they can hear the news; the hearing-impaired have teletype receivers turned on by the FM radio signal, and the deaf-blind receive their news and features via a Braille machine that is also signaled by the FM piggyback carrier. All the receiving equipment is supplied by the state.

The preparation of programs for the handicapped employs the editing and reading talents of 50 volunteers trained by Centex with the cooperation of the College of William and Mary. The deaf and homebound receive news and other services six hours a day; the blind receive additional entertainment through tapes of books run for them during the evening hours.

Paul Anderock, a project officer in BEH who also has a background in telecommunications, explains the new network another way: "John Curtis," he says, "plays the technologies like an orchestra conductor. He hasn't invented the various communications means he uses, but he knows where and how to bring them into play in the service of



education and the social services. I know of no other person who can use his knowledge in this way, get it working and funded. If John could live for another 40 years, I think he could change and revitalize our whole educational system through his genius in telecommunications."

"I visualize this interactive television concept moving way beyond the handicapped," says Dr. Henry W. Tulloch, member and ex-president of the Virginia Board of Education, "to the medical area and other kinds of activities—for instance, teaching adults through the extension work of universities. We have scratched the surface, but we are way ahead."

Training teachers of the handicapped

Project SETT UP (Special Education via Television—Teacher Upgrade) started broadcasting from the College of William and Mary's Phi Beta Kappa Hall. The receiving classrooms were located in two private schools—Walsingham and Jamestown Academies, in the children's division of Eastern State Hospital, in Magruder Elementary School in York County, and in six schools in the Williamsburg-James City School District. About 100 teachers were first contacted through SETT UP; when the Newport News antenna was added, 100 more were reached, and now that there

is a third tower more hundreds will be added.

The project has 12 full-time and 48 part-time faculty members and technicians. It operates on a \$425,000 budget, of which approximately \$125,000 is provided by the state and the rest by the U.S. Department of Education.

James T. Micklem, director of the Virginia Education Department's Division of Special Education Support Services, was of course deeply involved in, and responsible for, SETT UP. "All of this," he says, "grew out of a need for staff development in our schools. We had difficulty in bringing this about in a state with sparse population areas. When John Curtis approached us in the early 70s it occurred to us that we might do it at the local level. I saw the difficulties teachers had in driving distances or, even where we had television instruction, there was a message but no chance to talk back, and then maybe someone would come around once a month after a lecture to explain things.

"Now we can say 'bring the expert at the Medical College of Virginia to link back to teachers who deal with the most challenging children.' After more than five years of direct experience with the Centex programs, we are more convinced than ever that the combination of needs assessment, curriculum development, and innovative distribution

strategies provides the only economically practical means by which states can put together all aspects of the required comprehensive personnel preparation plan on a timely basis."

In 1978 Project SETT UP offered six different courses, each requiring attendance at 16 one-hour sessions. Schedules were arranged so that teachers could take more than one course if they wished. The next year seven additional one-hour courses were added on the strength of teacher enthusiasm, one of them for college credit. The courses covered a range of psychological and physical problems. Among the lecturers were: Dr. Ruth Mullikan of William and Mary College, who lectured on the psychology of learning disabilities; Dr. Elizabeth Daly of Christopher Newport College dealt with small group instruction; Dr. Ron David of the Medical College of Virginia lectured on early childhood handicaps; and Dr. Edward Tiller of the Piedmont Psychiatric Institute presented material on the classroom management of disruptive behavior.

Tapes of the sessions convey the interactive atmosphere of the system. A lecturer teaching language development and manual signing makes the sign for water, and then the class imitates his gesture.

A lecturer diagnosing handwriting difficulties shows samples of children's writing on the TV screen, and students comment on the anomalies and what they reveal.

Questions from students lead to more questions and discussions among people sitting many miles apart, with their attention focused on the same example or question.

The new antenna tower

The new tower, installed in August 1980, is at the convergence of King William County and the town of West Point. Superintendent Steve Baker has 18 schools in his district: two high schools, two junior highs, and 14 elementary. He speaks of convincing the school board in West Point to pay their way: "We have to point to the special education programs and how difficult it is to train teachers, and how expensive to bring in experts from other areas. The tower will cost \$275,000, and the schools will be able to produce their own programs if they wish.

"West Point High School offers two foreign languages, two years of each. Three or four counties could take one



German teacher and spread the lessons. We also thought about using television in drug education and prevention as well as in areas of the gifted. These are both areas for which good people are in short supply. We could join with other counties to use the system. In King-and-Queen and King William counties there are perhaps 20,000 people, 5,000 children in the three school systems. In our county, at about three percent of the population, there would be about 24 gifted children."

Dr. James Windsor, a member of Centex's board, sees a great future for the system in higher education. In Virginia there are eight colleges and universities and a medical school, as well as hospitals and medical centers, and he sees the possibility of linking all of them together. "One of the most exciting aspects to me is what the system can do in medical application. It can be joined to cable companies so that you can get a

signal by CATV and you can get into rural areas. A doctor could get or give professional briefings in his office. With one or more tower we can get a signal over to the Virginia Eastern Shore. The same system can be used for the social sciences; diagnostic interviews are possible, too, through the mental hospital in Norfolk."

Where the money goes

Thus far the federal government has spent \$1,700,000 on Virginia Centex projects; the state has put in over \$500,000, and local districts have invested over \$600,000, for a total of nearly three million dollars.

Time and again the savings in energy and in teachers' time were pointed out, and indeed many teachers might be apt to skip inservice sessions altogether in a period of gas shortage and/or inclement weather. The Centex system is a surefire way to prepare teachers for the diffi-

culties of serving more children at both ends of the spectrum of abilities.

The three top state officials, five school division superintendents, three curriculum specialists, and other state officials interviewed or contacted in the course of writing this article were all enthusiastic about the accomplishments to date of the Centex system. All were excited about the variety of uses for the system and possibilities for further development.

Says Dr. J. Wade Gilley, Jr., secretary of education for the Commonwealth of Virginia, "I am concerned with extending the network throughout Virginia and making it a permanent fixture." ★

FOR MORE INFORMATION

For more information readers may write to "CENTEX," c/o American Education, P.O. Box 23312, Washington, DC 20024.

Special Educators, but it also utilized the curricula and teaching expertise generated by Virginia's universities, school systems and medical schools meeting Project SETT-UP's self-established high standards.

Specification 4(a): "To implement an evaluation design and procedures for the collection of quantitative performance data"

A copy of the evaluation report for Project SETT-UP's first three semesters of Special Education instruction has been included to enable the readers of this report to assess the comprehensiveness and in-depth effectiveness of the evaluation procedures which CenTeX has established to measure the quality of its curricula and teaching expertise.

Specification 4(b): "The assessment of the effectiveness and efficiency of program resources"

This specification (like 1(c)) will be analyzed by the cost-effective analysis beginning on Page 29 of Section III following.

PART ONE

Section III - The Keys to the Depth, Breadth and Effectiveness of Project SETT-UP's Productivity and the Development of the World's First Multi-Media/Multi-Service Educational/Medical/Social Services Network with Reasonably Attainable, Long-Term, Self-Supporting, Self-Regenerating, Ever-Expanding Public-Service Potentials

- A. In the area of the development of needs-based, learning-efficient, nationally useful, marketable curricula;

Section II endeavored to prove that Project SETT-UP has met its commitments to produce timely, effective, needs-based, learning-efficient Special Education inservice teacher training by developing a step-by-step, nearly foolproof procedure to assure two objectives:

1. that the curricula developed or acquired by CenTex is:
 - a. needs-assessment based;
 - b. learning-efficient; and
 - c. nationally needed and marketable; and
2. that 12 or more 16-hour series for such curricula for inservice teacher recertification and/or college-level, advanced-degree level credit can be developed and delivered annually by a small, interdisciplinary organization not exceeding 12 in number--a figure which includes two stenographers--provided maximum by-product use is made of existing teaching expertise and materials.

This section will endeavor to define clearly the CenTex innovative and cost-effective distribution concepts which not only make possible what is believed to be a new and more efficient methodology for producing learning-efficient college-level professional training, but a new and more cost-effective delivery methodology to maximize the scope and timeliness, as well as continuing updating, of professional training--whether for inservice teachers, or for medical practitioners or for social workers.

What's more, this Section will endeavor to prove that many of the billions currently being spent for education can be more effectively invested in the intensive use of modern telecommunications methodologies and equipments--on a systematized basis--rather than on the intermittent, incoherent use of such methodologies and equipments, which to date has been true in most uses of these tools.

This Section will also make clear that, until Project SETT-UP put the CenTex network in operation, there was no demonstration of the needs for and benefits of system integration of modern telecommunications technologies with teaching expertise and curriculum development. Section II certainly demonstrated this point as far as curriculum production and practitioner teaching is concerned. This Section will demonstrate that this same observation is not only true in the areas of educational expertise and materials, but is also a basic requirement in the areas of distribution and cost effectiveness.

B. In the area of research preceding the establishment of the CenTeX CIT-PEDS network:

But the development of the CenTeX innovative, comprehensive distribution system did not come about during the four years of BEH funding of Project SETT-UP. Project SETT-UP funding, however, made possible the first demonstration of the CenTeX distribution concepts, thereby creating direct proof that there can be a third major dimension to America's educational processes which can be as critically important as practitioner (teaching) expertise and supporting materials--the capabilities and resources (including buildings)--on which America to date has spent billions and continues to spend billions of dollars.

The studies which enabled Project SETT-UP to demonstrate its innovative curriculum development, teacher training, distribution and cost-effective concepts have, however, been based on research by many persons. These concepts have been described by a number of papers, including some by Project SETT-UP's project director.

The first two of these (Centers for Excellence [©] and Learning Sciences and Teaching Technologies [©] by John A. Curtis) appeared in 1968 and 1969. These papers led to Mr. Curtis's appointment as Chairman of the Board of Consultants, formed at the request of the Common Carrier Division of the Federal Communications Commission, by the Joint Council on Educational Telecommunications in 1970 and to his subsequent appointment (1971) to the Committee on Issues of Educational Technology established by the National Academy of Engineering at the request of the U.S. Office of Education.¹¹

¹¹ Much of the thinking and recommendations of these two committees and the research findings of SETT-UP's project director were first reported by the following publications:

- (1) America's Educational Establishment and Its Needs for Effective Innovation and Major Changes by John A. Curtis. Produced for submission to Dr. Albert Horley, Director of the Office of Telecommunications Policy, U.S. Department of Health, Education and Welfare (1971)
- (2) A Design for a Multi-Media, Multi-Service Regional Network by John A. Curtis (for the Datran Corporation) (1972)
- (3) Recommendations for a National Educational Telecommunications Network by John A. Curtis. Delivered at the plenary session of the third annual Frontiers in Education Conference, Purdue University, April 9-11, 1973
- (4) Needed: A National Telecommunications Network for Education by John A. Curtis and published in the May 1974 issue of Engineering Education
- (5) Issues and Public Policies in Educational Technology by the National Academy of Engineering's Advisory Committee on Issues in Educational Technology, published by D. C. Heath and Company in late 1974
- (6) Educational Telecommunications Delivery Systems, edited by John A. Curtis and Joseph M. Biedenbach, and published in 1979 by the American Society for Engineering Education

Five of the pre-Project SETT-UP research years led to the 1973 founding of the Center for Excellence, Inc., to test the applicability, operational requirements and cost effectiveness of CenTeX educational process concepts. Project SETT-UP funding and subsequent major additional funding supplied by the U.S. Department of Health, Education and Welfare; the Virginia Department of Education, Special Education Division; and the U.S. Department of Commerce, however, have made it possible for CenTeX to demonstrate, for the first time, the practicability, the cost effectiveness and the timeliness of its recommended innovations.

An example of the pre-Project SETT-UP research is the summary (Page 32) of CenTeX studies seeking to determine what educator/medical/social-services practitioners want in any telecommunications network designed to serve them.

C. Research-identified system requirements:

The research-dictated innovations, concepts and usefulness in America's educational/medical/social service processes can now be clearly identified.

1. In the area of curriculum development: (See Section II of this report.)
2. In the area of telecommunications delivery systems:¹²

Project SETT-UP and its associated projects have, since 1976, together created the world's first network which is:

- (a) multi-media;
- (b) multi-service;
- (c) two-way;
- (d) privacy-protectable;
- (e) multi-origination point;
- (f) locally controllable and usable;
- (g) low-powered; and
- (h) user-supportable.

By being multi-media, this network can utilize one or more of the six available telecommunications technologies most effective and economically practical for the delivery of specific educational/medical/social services. Further, it enables CenTeX-type systems

¹²Details regarding the current operating status of CenTeX's Tidewater-located system and the multi-public services currently being delivered by CenTeX are subsequently described.

TELECOMMUNICATIONS TECHNOLOGIES ANALYSIS CHART:
EDUCATIONAL/PSYCHOMEDICAL REQUIREMENTS VS. CAPABILITY AND COST FACTORS

	Analog Circuitry	Digital Circuitry	Real Time Capability	Direct Line Access	Easy User Access	24-hour Availability	Geographic Coverage	Two-Way Voice	Two-Way Video	Multi-Channel	Privacy	Economic Practicability	Applicability to Structured Educational/Psychomedical Services	A - Good B - Fair C - Poor D - Not useful
AM Broadcasting Stations	yes	no	yes	no	no	yes	yes	no	no	no	no	C	D - meets few of the educator-specified requirements for a telecommunications delivery system.	
FM Multiplexed Circuits	yes	yes	yes	no	no	yes	yes	no	no	no	yes	B	C - useful for some applications	
Videocassettes	yes	yes	no	no	no	no	no	no	no	yes	no	B	C - useful as a storage medium; does not provide economic, real-time, easy user access or privacy	
Public Broadcasting	yes	no	yes	no	no	yes	yes	no	no	no	no	D	C - useful only for general information and curricula distribution. No privacy	
Normal Telephone Circuits	yes	no	yes	yes	yes	yes	yes	yes	no	yes	yes	A	C - no video, no digital capability	
Special Telephone Circuits	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	D	D - wide-band circuits are often not available; always costly when compared with other media	
CATV Circuits	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	B	B - Not available in many areas. Often does not have two-way capabilities, which can be costly.	
Satellite Circuits	yes	yes	yes	no	no	yes	yes	yes	yes	yes	no	D	C - Equipment is costly, not easy to install or operate; will be useful for single channel distribution to sparsely settled areas.	
ITFS Circuits	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	A	A - the only available methodology capable of meeting all educator-developed system specifications	

to make maximum use of existing telecommunications facilities, thereby reducing the time-and-dollar capital investments required to build a network, as well as continuing network operating costs. For instance, CenTeX uses the subcarrier of a commercial station to deliver its broadcast services to the sensory-deprived. By taking off its privacy-protection circuits, CenTeX uses the CATV component of its network to reach 108,000 homes and 302,400 persons with its evening Education for the Whole Family programming.

By being multi-service, this network can create sufficient user traffic to make it an economically viable operating entity (as will subsequently be made clear).

By being two-way, this network can provide the classic, direct instructor-student two-way relationship so essential to the maximization of learning efficiency (and the question-and-answer, two-way, face-to-face diagnostic discussions and continuing education needs of the medical practitioner and social worker). For instance, CenTeX experimentation indicates that two-way-system-served students get more A's and B's than one-way-system-served students (78.1% vs. 60.0%). Two-way systems have a drop-out rate of less than 1%, whereas one-way systems have a drop-out rate as high as 23.1%. CenTeX's mobile-fixed truck station--the first ever to be licensed by the Federal Communications Commission in the ITFS spectrum--enables CenTeX to deliver two-way educational, diagnostic and medical services and information to homebound persons, including teenaged pregnant school children.

By being privacy-protectable, the CenTeX network can protect individual rights and privacy; reduce copyright costs and risks; protect tuition-based instruction-and-service systems; and ensure the delivery of sensitive services and information discretely to targeted populations.

By being multi-origination point, the CenTeX system facilitates the economical and convenient use of resources, be they those of the professional practitioner--a facility--or a material-based data bank.

By being locally controllable and usable, stations can be simultaneously utilized for the delivery of local programming and services, as well as for network (long-distance), inter-station delivery. Thus, a basic tenet of the U.S. democratic system--local control and diversity of educational processes--can be effectively maintained and local telecommunications delivery system benefits maximized by users of the CenTeX system.

By being low-powered (CenTeX stations have only 10 and 50 watts of power output, as compared to the half-million and million-watt public broadcasting and commercial TV stations), the CenTeX system becomes the nation's most economical and only hands-on, directly-practitioner-usable telecommunications delivery system today available for the distribution of educational/medical/social services.

Further, the combination of 1-7 on the preceding page have (as will be subsequently supported) made the CenTeX network an economically viable, user-supportable system.

D. The critical rural and ghetto telecommunications delivery-system requirements and the economic way to provide them:

A recent study made by the Virginia State Department of Education, under the supervision of Dr. N. Grant Tubbs and analyzing the status of Virginia's inservice teacher training programs, makes these findings:

1. 58.1% of the 75 school divisions studied spend less than the state-desired minimum of \$3 per student.
2. The underspending school divisions are located primarily in rural areas and cities with low school taxation.

The CenTeX system recognizes the importance of these Tubb-study revelations.

The CenTeX system design strategies have, for the first time, in fact made economically practical the delivery of both classical and special needs-based education to rural- and ghetto-located populations.

The CenTeX system concept accomplishes this important socio-economic objective:

1. by building a CenTeX-type Backbone network running between populous and affluent areas; and
2. by using CenTeX-type Rib stations to deliver to rural and ghetto areas, on a by-product basis, the teaching expertise and materials which only the populous city areas and the affluent suburban areas can afford to acquire and distribute.

E. The continuing need for the services of a telecommunications applications research laboratory:

Project SETT-UP and its subsequently funded associated projects have not only created this nation's first multi-media, multi-service, privacy-protectable, low-powered, multi-origination-point, two-way telecommunications delivery system and an innovative, careful, time-saving, more economical curriculum production methodology, but this funding support has also established the world's first Applications Research Laboratory to determine the applications usefulness, the operating requirements, the capital requirements and the cost-effectiveness of telecommunications networks designed specifically to deliver educational/medical/social services expertise and materials, and further to develop the organizational and cost-control methodologies required to assure low-cost, low-overhead operations of this type of telecommunications system use.

The CenTeX Applications Research Laboratory is, for these reasons, a unique entity with powerful capabilities:

1. The critically needed, near-perfect microcosmic geographic area of American life.

The Laboratory functions in a geographic area which is a near-perfect microcosm of American socio-economic life. (CenTeX spent thousands of dollars to determine the few microcosmic areas existing in America before establishing its Laboratory in the Tidewater area of Virginia.)

The following data support the judgment by CenTeX-employed sociologists that Virginia's Tidewater area is a near-perfect microcosm of American social, ethnic and economic life.

Socio-economic-ethnic factors regarding the CenTeX Applications Research Laboratory:

	<u>Virginia</u> <u>Total</u>	<u>% of</u> <u>State</u>	
Virginians	4,648,494	40.4	
Blacks	861,363	60.1	
Indians (Native Am.)	25,612	45.4	<u>Persons Per Mile</u>
Whites	3,761,514	35.8	Norfolk 5,400 City
Other (Hisp./Asians)	4,853	57.1	Chesapeake 3,062 Suburb
School Age	1,169,011	39.4	King and Queen 18.2 Rural
Handicapped	87,263	39.1	<u>Median Income</u>
Homebound	3,737	48.4	Williamsburg \$ 17,069 Hi
Teachers	63,596	39.7	Northampton \$ 6,909 Lo
Physicians	10,188	43.3	Tidewater \$ 11,986 Av
Health	58,817	43.6	
Over 65	366,021	39.0	

2. The strategic importance of a near-Washington, DC, operating location.

The Laboratory operates near Washington, DC, so that it is easy to use the nation's most comprehensive resource and information centers, such as the Library of Congress, the National Medical Library, the National Center of Education Statistics, the Committees of the Congress, the pertinent federal regulatory agencies such as the Federal Communications Commission, and federal funding sources.

3. The valuable assets brought by an interdisciplinary Board of Directors.

The CenTeX Board of Directors includes representatives of every major public and private type of organization responsible for Virginia's educational/medical/social services. The experience-based knowledge of this Board reduces both the time and costs of applications needs and uses and helps assure the direction of CenTeX Laboratory research efforts toward major, practical, properly prioritized targets.

4. The need for a "lean" interdisciplinary, low-overhead organization and a "stable" of component, when-needed professionals.

The CenTeX organization is also interdisciplinary. It therefore can make accurate selections of part-time, as-needed, qualified professionals to supplement its own capabilities and to make economic use of such talents. Thus, CenTeX's Laboratory can produce major research results and comprehensive concept development without the need for a top-heavy, costly full-time corps of complementary, interdisciplinary experts.

5. The ready availability of pertinent "test" audiences and users.

CenTeX's 20-year contracts with Tidewater school systems include the provisions necessary for CenTeX:

- (a) to tap school faculty talents and experience,
- (b) to use school and college faculties as test groups,
- (c) to run tests in rural, as well as urban and suburban, areas.

CenTeX's university agreements provide similarly the necessary college- and university-level test groups.

These agreements also include provisions for annual surveys to determine user needs and the evaluation testing of CenTeX-organized expertise, curriculum and materials development, organizational strategies, and economic and operational concepts.

6. The ready availability of the necessary laboratory telecommunications circuits and types thereof.

The CenTeX delivery system already includes circuits using four of the six telecommunications technologies available for the distribution of educational/medical/social services expertise and materials.

CenTeX not only has access to the studies made by Virginia's State Department of Education regarding its decade-long use of public broadcasting, but it has a working research arrangement with one of Virginia's five public broadcasting stations (CenTeX hopes shortly to develop similar research arrangements with the four other Virginia-located public broadcasting entities).

The only one of the six available telecommunications not yet available for hands-on use and technical support services is satellite circuitry. A group has been organized to make this capability available to CenTeX during 1982 and has already contracted for the satellite time to make this additional circuitry a reality.

The important point is this: the CenTeX Laboratory has its own network and the facilities to test under controlled conditions the use of today's four most effective methodologies for the delivery of educational/medical/social services; has the necessary working arrangement with a fifth type (PBS); and hopes shortly to have its own two-way satellite circuit accessibility.

Equally important are these facts:

- (a) The CenTeX-built laboratory network circuits have been designed to transmit efficiently at low cost both wide-band and narrow-band, two-way information; digital or analog transmission as use dictates; audio, video, hard copy or live two-way transmission.
- (b) The CenTeX-built system uses spectrum areas where multi-channels are available for research, as well as for operating service use and system expansion.

(c) By using its own multi-media network, CenTeX is able to reach and develop rapidly and economically total research laboratory packages, which include:

- (1) needs assessments;
- (2) professional requirements;
- (3) materials requirements;
- (4) organizational requirements;
- (5) protocol requirements;
- (6) human-factor requirements;
- (7) operating requirements;
- (8) regulatory factors;
- (9) political and other public relations factors;
- (10) the potentially useful existing and "over-the-horizon" technologies available to serve identified needs;
- (11) the potentially useful existing and "over-the-horizon" equipments and system concepts available to serve identified needs;
- (12) cost requirements.

With these requirements and means identified, cost-effective and use analyses can be accurately and promptly developed.

7. The experience, technical and management support of American's only society of user-supported operators of educational/medical/social services telecommunications delivery systems.

CenTeX's president founded the National Instructional Telecommunications Council, Inc., a professional society of non-profit entities operating educational/medical/social services telecommunications delivery systems.

The here-important points regarding the numbers of this professional society are listed below:

- (a) They have an average operating life of more than ten years.
- (b) They operate in big cities, small cities, suburban areas and rural areas.
- (c) With few exceptions, their services are considered so valuable that they are operated solely on user-provided dollars (without the need for federal dollars), and some of them even show income-over-operating-cost margins.

- (d) These entities serve all levels of education, medical and social services, and are nationally spread out over the nation.
- (e) The NITC (pronounced "Night-See") society was formed to facilitate the exchange of engineering, fiscal, management and other operating experience by its members, and to share materials and innovative thinking.
- (f) CenTeX is the central receiving-and-distribution point for the information and confidential thinking of this national self-supported matrix of time-tested and user-evaluated-and-financed telecommunications delivery system operators.

Thus, CenTeX's Applications Research Laboratory has access to a decade of successful educational/medical/social services telecommunications delivery system experience and a continuing source of effective technical and management consultation.

NITC members also aid CenTeX's Applications Research Laboratory by identifying needs, professional talent, curriculum availability and by providing secondary test-beds for CenTeX-developed curriculum technical, fiscal and managerial concepts and markets for its for-sale curriculum products.

No other Educational/Medical/Social Services Telecommunications System Applications Research Laboratory has direct and rapid access to this critically important, nationally comprehensive and operationally successful, time-proven experience regularly used by CenTeX and supplied by the NITC membership to assure the scope, depth and national accuracy of CenTeX thinking and program developments.

Thus, the CenTeX Applications Research Laboratory is the only such entity in America that has in place the inter-disciplinary professional capabilities, the network facilities and the evaluation techniques that can determine accurately the likely usefulness and cost-effectiveness of new concepts and equipments as they may be applied to educational/medical/social services telecommunications delivery systems and/or to apply the new and/or existing techniques to the existing delivery requirements of these basic public services.

F. The development of two-way delivery-system distribution scope and applications flexibility:

As has been previously stated, one of the major basic objectives of the federally supported Project SETT-UP and its successor, Virginia state-supported Project ITTS, was (and continues to be) the multiplication of the productivity of an effective, qualified Special Education instructor by enabling the instructor:

- 1. to deliver simultaneously from a central point to remote classrooms and multiple-student groups; and thereby

2. to maintain two-way communications between these remotely located classrooms and student groups so that students can ask questions and receive instructor answers (or vice versa) to maintain the level of efficient learning obtainable by classical face-to-face classroom instruction;
3. to let all students, as well as the instructor, hear all questions and answers regardless of where they originate so that the redundancy of questions and answers is minimized and teaching time efficiently utilized to the benefit of both student and instructor; and
4. to lower the per-student cost of effective teaching by multiplying the productivity of the better instructor.

By meeting these four system-wide specifications, the system jointly developed by BEH's Project SETT-UP and Virginia's Project ITTS, the following regarding the instructional usefulness of the CenTeX CIT-PEDS network can be stated:

(a) regarding delivery-system distribution scope:

The currently in-operation CenTeX system

- (1) today serves the geographic areas in which 23.3% of Virginia's total population lives and having 14,436 public school teachers and 272,717 school-aged children;
- (2) expects by the end of 1982 to be serving 34.0% of Virginia's total population and 20,820 teachers and 384,664 school-aged children;
- (3) already can deliver teacher training to 118 Tidewater area school locations;
- (4) can, by removing the privacy circuitry, reach the CATV subscribers' homes and approximately 302,400 people;
- (5) will, by the end of 1982, be reaching 230,000 CATV subscribers' homes and 644,000 persons (Page 40). (On the pages immediately following this one are detailed data supporting the preceding statements);
- (6) can, as the previously included evaluation reports make clear, deliver learning-effective, classroom-comparable instruction to the sizeable audiences listed by (1)-(5) previously;
- (7) because CenTeX courseware is needs-based and high quality, Virginia's Public Broadcasting Stations will this Fall begin broadcasting "second-run" half-hour modules of CenTeX's inservice teacher training curricula.

CENTEX © CATV NETWORK COMPONENT
Home Subscribers and Viewing Populations

I. In Operation	PAID SUBSCRIBERS*			ESTIMATED MINIMUM NUMBER OF VIEWERS*		
A. Cox	Now	Expected by 12/31/82	Long-Term Projections	Now	Expected by 12/31/82	Long-Term Projections
Norfolk	24,000	40,000		67,200	112,000	
Portsmouth	11,000	11,000		30,800	30,800	
Virginia Beach	35,000	70,000		98,000	196,000	
SUBTOTALS	70,000	121,000		196,000	338,800	
B. Warner/Amex (Hampton/ Williamsburg/ Poquoson)	20,000	27,000		56,000	75,600	
C. Hampton Roads Cablevision (Newport News)	18,000	25,000		50,400	70,000	
TOTALS NOW REACHED BY CENTEX	108,000 homes	173,000 homes		302,400 persons	484,400 persons	
II. 1982 Additions Continental (Richmond/ Henrico County)	36,000 homes	57,000 homes		100,800 persons	159,600 persons	
I AND II TOTALS	144,000 homes	230,000 homes		403,200 persons	644,000 persons	
III. To be Added During 1982	Not less than four--and more likely six-- operational status are likely to be added			CATV networks now in planning and/or near to the CenTeX CATV network during 1983.		

*Demographic statisticians usually use 2.8 persons per home as a statistical average.

Geographic Area	Number of School Age Population	Number of School Age Homebound	Total Number of School Age Handicapped Including Homebound	Number of Print Handicapped	Number of Deaf	Number of 75 and Older	Total Number of Teachers	Total Number of Physicians	Total Health Population	Total Population
A. East Central Network										
1. Williamsburg ITFS Station										
Williamsburg-James City County	5,448	8	521	64	48	915	323	89	511	25,935
Upper York County	3,358	16	185	11	20	162	182	13	133	11,067
Surry County	1,478	1	129	14	20	222	112	5	47	5,882
Sub-total	10,284	25	835	89	88	1,299	617	107	691	42,884
% of State Total	0.9	0.7	1.0	0.9	1.1	1.0	1.0	1.1	1.2	0.9
2. Newport News ITFS Station										
Newport News	32,783	138	2,045	235	248	2,654	1,699	303	1,750	138,177
Hampton	32,497	67	1,581	185	218	2,088	1,747	255	1,556	120,904
Poquoson/Lower York County	8,751	33	515	23	39	325	472	26	267	22,135
Isle of Wight	4,894	18	297	49	32	515	286	0	141	18,285
Subtotal	78,925	256	4,438	492	537	5,582	4,204	584	3,714	299,501
% of State Total	6.8	6.9	5.5	4.8	6.4	4.2	6.6	5.7	6.3	6.4
TOTAL (1 + 2)	89,209	281	5,273	581	625	6,881	4,821	691	4,405	342,385
% of State Total	7.7	7.6	6.5	5.7	7.5	5.2	7.6	6.8	7.5	7.3

Geographic Area	Number of School Age Population	Number of School Age Homebound	Total Number of School Age Handicapped Including Homebound	Number of Print Handicapped	Number of Deaf	Number of 75 and Older	Total Number of Teachers	Total Number of Physicians	Total Health Population	Total Population
3. Virginia Beach Area ITFS Station										
Norfolk	51,984	344	3,154	729	554	7,188	2,827	572	3,460	307,951
Portsmouth	23,791	134	1,687	242	200	3,047	1,285	244	1,765	110,963
Chesapeake	29,105	49	1,678	248	225	1,716	1,465	54	810	89,580
Virginia Beach	60,138	201	4,310	242	310	2,070	2,919	338	1,459	172,106
Sub-total	164,928	728	10,829	1,461	1,289	14,021	8,496	1,208	7,494	680,600
% of State Total	14.1	19.5	13.3	14.3	15.4	10.6	13.4	11.9	12.7	14.6
TOTAL	254,137	1,009	16,102	2,042	1,914	20,902	13,317	1,899	11,899	1,022,985
% of State Total	21.8	27.1	19.8	20.0	22.9	15.8	20.9	18.7	20.2	21.9
4. West Point ITFS Station										
Gloucester Co.	3,633	12	220	37	25	651	212	31	266	14,059
Lower King & Queen Co.	855	1	92	10	6	186	50	0	6	3,808
Lower King William Co.	1,076	1	141	20	9	188	61	0	26	5,327
New Kent Co.	1,862	4	237	11	9	146	110	5	36	5,300
Middlesex Co.	1,490	0	123	16	11	443	94	6	45	6,295
Sub-total	8,916	18	813	94	65	1,614	527	65	379	34,789
% of State Total	.8	.5	1.0	.9	.8	1.2	.8	.6	.6	.7
TOTAL	263,053	1,027	10,915	2,136	1,979	22,516	13,844	1,964	12,278	1,057,774
% of State Total	22.6	27.6	20.8	20.9	23.7	17.0	21.8	19.3	20.8	22.6

Geographic Area	Number of School Age Population	Number of School Age Homebound	Total Number of School Age Handicapped Including Homebound	Number of Print Handicapped	Number of Deaf	Number of 75 and Older	Total Number of Teachers	Total Number of Physicians	Total Health Population	Total Population
5. Central Garage ITFS Station										
Western King & Queen Co	366	1	40	6	3	80	22	0	2	1,633
Western King William Co.	448	1	60	10	4	80	33	0	13	2,283
Eastern Hanover Co.	6,786	9	390	36	38	549	413	57	231	23,589
Essex County	2,064	2	136	16	13	327	124	22	47	7,105
Sub-total	9,664	13	626	68	58	1,036	592	79	293	34,610
% of State Total	0.8	0.4	0.8	0.7	0.7	0.8	0.9	0.8	0.5	0.7
TOTALS (1-5)	272,717	1,040	17,541	2,204	2,037	23,552	14,436	2,043	12,571	1,092,384
% of State Totals	23.4	28.0	21.6	21.6	24.4	17.8	22.7	20.1	21.3	23.3
6. Richmond Area ITFS										
Henrico Co.	36,785	180	2,862	123	277	3,626	2,099	645	2,547	154,364
Western Hanover Co	5,011	6	288	26	28	405	251	42	170	15,942
Richmond City	39,987	204	4,179	1,136	450	10,606	2,329	965	5,791	249,621
Chesterfield Co.	30,164	55	1,915	64	138	1,144	1,713	188	933	76,912
Sub-total	111,947	445	9,244	1,349	893	15,781	6,392	1,840	9,441	496,839
% of State Total	9.6	11.9	11.4	13.2	10.7	11.9	10.1	18.1	16.1	10.7
TOTALS (1-6)	384,664	1,485	26,785	3,553	2,930	39,333	20,820	3,883	22,012	1,589,223
% of State Totals	33.0	39.9	33.0	34.8	35.1	29.7	32.7	38.2	37.4	34.0
213										

Geographic Area	Number of School Age Population	Number of School Age Homebound	Total Number of School Age Handicapped Including Homebound	Number of Print Handicapped	Number of Deaf	Number of 75 and Older	Total Number of Teachers	Total Number of Physicians	Total Health Population	Total Population
7. Petersburg Area ITFS Station										
Charles City Co.	1,935	10	284	19	11	169	111	5	18	6,158
Prince George Co.	6,186	2	349	14	52	269	311	16	283	29,004
Hopewell	5,771	24	455	40	41	555	318	36	325	23,471
Petersburg	9,714	37	579	181	65	1,350	558	158	998	36,103
Colonial Heights	4,236	2	240	20	28	379	253	54	226	15,097
Northern Dinwiddie County	2,500	4	292	12	20	385	150	25	191	11,183
Sub-total	30,342	79	2,199	286	217	3,107	1,701	294	2,041	121,104
% of State Total	2.6	2.1	2.7	2.8	2.6	2.3	2.7	2.9	3.5	2.6
East Central Network Totals (1-7)	415,006	1,564	28,984	3,839	3,147	42,440	22,061	4,177	24,053	1,710,327
% of State Total	35.5	41.9	35.7	37.5	37.7	31.9	34.7	41.1	40.9	36.6

215

(b) regarding system flexibility:

Because the CenTeX CIT-PEDS system is multi-media and has been designed to carry analog, digital, wide-band and narrow-band transmission and can (or cannot) provide privacy-protected circuitry, CIT-PEDS can provide the type of transmission which most effectively and economically meets user needs.

For instance, the morning hours (7 AM-1 PM) of its network are used by participating schools to broadcast locally:

- (1) two-way teleconferencing between administrators, staff directors, principals and teachers (usually privacy protected);
- (2) to distribute pupil-developed programming, such as news programs (seldom privacy protected);
- (3) to supply back-up instruction for the slow-learner and/or fast-learner (which may or may not be privacy protected);
- (4) to provide "open time" programming (which is never privacy protected); and
- (5) to deliver programming for special groups (such as the sensory-deprived) or those needing special courses, such as Russian, advanced math or musical composition.

The afternoon hours (1 PM-7 PM) are used for professional inservice and/or advanced-degree instructional courseware and almost always are privacy protected.

During the evening hours (7 PM-10 PM), CenTeX takes off all privacy protection and broadcasts a new type of TV programming--Whole Family Education (W.F.E.) Programming.

Programming attempts to deliver in-home programming that is appealing to parents and siblings, with 7-8 PM programming usually of special interest to elementary-aged siblings; 8-9 PM programming to secondary school siblings; and 9-10 PM programming to adults and the gifted (such as college-credit courseware), excerpts from school board and/or Parent-Teacher Association meetings, which the CenTeX mobile transmitter-receiver makes possible recording and/or transmitting live.

Meanwhile, CenTeX's subcarrier/CATV system for the sensory-deprived has been delivering 40 hours per week of programming specifically designed and formatted to meet the needs of the visually impaired, the hearing impaired, the deaf-blind, the aged and the homebound.



Newport News Public Schools

12465 WARWICK BOULEVARD • BOX 6130 • NEWPORT NEWS, VIRGINIA 23606 • 804-599-4411 8600

June 12, 1981

Mr. John A. Curtis, President
CenTeX
P. O. Box 158
Williamsburg, VA 23185

Dear John:

This morning I had the opportunity to speak to the entire school staff in some thirty buildings. It was made possible through the use of CenTeX. I want to express my appreciation to your organization for the cooperation and technical assistance.

The opportunity this morning made me realize the potential for use of this medium in other areas. We have a fine staff development department but the staff is small and the need for their service is so great. I would envision that sometime in the future teachers in their buildings could have the benefit of inservice from our central office through a facility like CenTeX. As we are required to do more and more with less and less we must explore opportunities such as I mention.

Again let me express my appreciation for your help this morning.

Sincerely,

Oliver C. Greenwood
Superintendent of Schools

mcp



Staff photo by JOE FUDGE

Berkeley Elementary School students prepare a "Berkeley News Tracks"

show live and unrehearsed from the auditorium stage.

Quiet on the set, roll credits for . . .

News Tracks

The Times-Herald, Thursday, Dec. 11, 1980

By BILL McLAUGHLIN

Times-Herald Staff Writer

JAMES CITY — Children in every classroom at Berkeley Elementary School laugh when sixth grader Kathi Gillette tells the "joke of the day" from her seat on the stage of the school auditorium.

Question: "Why did the cow cross the road?"

Answer: "Because the chicken was off duty."

Kathi's audience is able to see and hear her in their classrooms via Center for Excellence (CenTeX) television monitors.

They pickup the Williamsburg area newest morning news show called "Berkeley News Tracks."

It's telecast live and unrehearsed from the auditorium stage at the school.

Soon, the temporary TV studio will be moved into a CenTeX trailer behind the school, when "Berkeley News Tracks" will be beamed to all seven Williamsburg-James City County schools, says Gene Bruss, the teacher who along with Principal Vincent Fritlici, conceived the idea for the program.

The Joke of the Day segment is one of the most popular of the 15-minute show, which regularly includes an item of trivia, the day's cafeteria menu, national news, sports, school news, entertainment, weather, exercises, the pledge of allegiance and at least one special feature.

The special features may include guest appearances of children from other classrooms, awards — usually given by Bruss dressed in costume — recipes and book reviews.

The regular announcers are 12 of the 27 students in Bruss' reading class, all of whom are at or above grade level.

Announcers were chosen last month, says Bruss, after a series of TV tapes made others decide "they didn't want to be TV personalities."

"We had a lot of dry runs in the classroom before we went on the stage, learning how to perform on television," says Bruss.

"The children are responsible for the show. They write their own material. I don't edit it or even see it before it goes on the air. There are no rehearsals; it's a straight, live show.

When "Berkeley News Tracks" had its premiere in November, many of the announcers were highly nervous at the start of each program, but now they're "as relaxed as professionals," says

Bruss.

He adds the program doesn't just help his students with their reading, but gives them practice in writing, editing and public speaking.

"We haven't even scratched the surface yet," says the teacher. "Tomorrow, we're going to include a creative commercial for an imaginary product. When we begin telecasting to the entire system, we'll have students come in from other schools to help with special features.

"And soon, with the help of CenTeX personnel, the children will begin operating the TV camera."

At the outset, Bruss and the children are "happy" to leave camera operation to the "real professionals," but they'll soon be learning that behind-the-scenes phase of television.

"Who knows, some of the children might even decide on a career in TV communication," says Bruss.

"Berkeley News Tracks" isn't the first time students have used the CenTeX system, which in the past has primarily been used for in-service teacher training.

A presidential debate, featuring student surrogates for Jimmy Carter, Ronald Reagan and John Anderson, was held shortly before the Nov. 4 election.

Bruss plans to inaugurate a televised spelling bee in the spring to "find the Berkeley champion" who will enter the national spelling bee sponsored by The Times-Herald.

Sue Foutz, another Berkeley teacher who has been instrumental in using the CenTeX system, plans to begin a televised game show, similar to "College Bowl," in the near future.

"We're just getting started," says Bruss.

On "Berkeley News Tracks," the announcers vary their subjects from day to day.

For example, in the same show Kathi Gillette told the Joke of the Day, the lineup was:

Scott Rutter, trivia; Ricky Smith, menus; Greg Pendleton, weather; Jared Moore, sports; Aaron Small, national news; Jim Sheridan, school news; Amanda Sandos, entertainment; Ramona Bartlett, exercises, and Lara Hoyle, Pledge of Allegiance.

The day's special event included a two reports: one by April Siemon on Student Council Association activities and another on "Santa's Shop" by Susan Lingerfelt, dressed as an elf.

'Anderson' wins debate

John Anderson was the hands-down winner of the mock Presidential debates held at Berkeley Elementary School last Friday, Oct. 24.

Seven students in the Berkeley and Bruton Heights gifted and talented program, PRISM, assumed the roles of the three major party candidates — Reagan, Carter and Anderson.

Students at the two schools have been following the election process very closely

SCHOOL NEWS

by reading newspapers, magazines and pamphlets, and watching the news every evening.

Children from both schools submitted questions to be asked of the candidates during the debate. Although the student candidates were well versed on their respective candidate's views, they still had to respond to the questions "cold," as in a regular debate.

Henry Renz, school division superintendent, Gail Hood, school board member, Wayne Block, WBCI news director,

and Merry Feyock, PTA Council president served as judges for the event. They watched and listened to each candidate closely, judging them on poise, delivery, and accuracy of information.

Bonnie Rifkin, PRISM

resource teacher for grades 4-6, served as the panel moderator. The event was made possible by the Centex staff who designed an elaborate set for the debate and telecast the debate for other interested schools.



Daniel Fuchs portrayed John Anderson in the mock Presidential debates at Berkeley Elementary School last Friday.

Williamsburg-James City County Public Schools
Williamsburg, Virginia 23185

PRISM Program

An Invitation

The PRISM Program is going to try something new this semester, a Meet the Press style television program. Selected high school students will be trained both to operate television equipment and to conduct effective interviews.

Interviews will be conducted primarily at the CENTEX studio at Berkeley School, although some may be held on location if the situation demands. CENTEX is a very sophisticated color studio and with their help we can produce a very professional program.

Personalities interviewed will include local officials, such as the Mayor, President of William and Mary, city councilmen, and state legislators. Visiting dignitaries to Colonial Williamsburg and William and Mary will also be contacted for possible interview time.

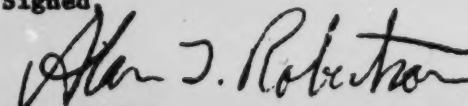
Students involved in this project will be trained at Berkeley at a time and day of the week to be arranged. Students will have direct input into this decision.

All interview programs will be broadcast live to each of our area schools. They will also be taped for later viewing by anyone who is interested.

Because of your interest in radio, television journalism, you are invited to participate in the new project. If you are interested, sign this form and return it to Mrs. Dunnigan at Lafayette by Friday, January 16.

I look forward to working with you.

Signed



Alan T. Robertson
Coordinator

Gifted-Talented/Community Resources

NAME _____

GRADE _____

GENERAL INTEREST:

TV Production _____

Interviewing _____

Both _____

glh
01/07/81

The Center for Excellence, Inc.
presents

EDUCATION FOR THE WHOLE FAMILY

The Center for Excellence, Inc. (CenTeX) is a non-profit, IRS-approved, research and resource development corporation located in Williamsburg, VA. CenTeX's objectives include providing educational, medical, and social services to people by using modern telecommunications (television, radio, satellite, cable television, etc.).

CenTeX has been using special television channels to provide training courses to Tidewater area teachers and has been broadcasting special radio programs for the deaf and the blind of Tidewater for over four years. CenTeX has been planning to expand its programming to include information of use to the general public and, starting on the evening of October 5, 1981, CenTeX will begin this series of programs.

The evening programming will be available at no cost to any cable television subscriber. The programming will be broadcast every weekday evening from 7:00 PM to 10:00 PM and will be devoted to family-significant educational programs.

1981 FALL PROGRAMMING SCHEDULE

	Monday	Tuesday	Wednesday	Thursday	Friday
6:30	P r o g r a m s b y r e q u e s t				
7:00 to 8:00	Kindergar- ten and Elementary Programs	Educating the Gifted and Tal- ented Child:	Kindergar- ten and Elementary Programs	Educating the Gifted and Tal- ented Child:	Kindergar- ten and Elementary Programs
8:00 to 9:30	Programs for the Second- ary Student	of interest to teachers and parents ↓	Programs for the Secondary Student	of interest to teachers and parents ↓	Programs for the Second- ary Student
9:00 to 10:00	Programs of interest to parents and teachers		Programs of interest to parents and teachers		Programs of interest to parents and teachers

The schedule has been designed to make it easy for parents and children to view the program together at convenient times. The Monday night programming is repeated again on Wednesday night and on Friday night. Thus, it is relatively easy for the family to arrange to view the programs on the most convenient evening. The Tuesday programming is repeated on Thursday, giving viewers two chances to watch the programs dealing with Educating the Gifted and Talented Child.

Also, as the schedule illustrates, a block of time has been reserved from 6:30 to 7:00 every evening for program requests. If a family wants to see a particular program again, or has missed a program, they can call CenTeX and ask that the program be repeated on a specific night. Because the block of time is only 30 minutes per evening, program requests will be fulfilled on a first-come, first-serve basis.

The programs have been scheduled so that they will augment what your children are studying in school. Parents are encouraged to watch some of the programs with their children to help the kids get the most from the program.

Other programs, especially those broadcast after 9:00 PM Monday, Wednesday, Friday or those dealing with the Gifted Child (Tuesday and Thursday), are designed primarily for parents and teachers. The program guide lists all of these programs.

The evening programming guide also contains a short description of each program and suggests some family activities to accompany the programs.

If you are interested in receiving a detailed guide listing of all of the programs for October 5 through December 28, or if you have any questions regarding the programs, please write to CenTeX at the following address:

EVENING PROGRAMMING GUIDE

CenTeX

P.O. Box 158

Williamsburg, VA 23187

G. Developing and using cost-saving techniques and equipments:

1. The use of low-powered equipment:

As will be noted from the chart below, the use of low-powered equipment by the system means less capital investment and less annual power costs for more "air" time.

Type and Number of Stations	Distribution Coverage Area (in Sq. Mi.)	Approximate Cost of Stations	Approximate Annual Power Costs	On-Air Time
A. Six two-channel ITFS stations	4,800	\$ 1,800,000	\$ 11,082	24 hours
B. 32 one-channel UHF network stations	4,800	\$ 9,600,000	\$ 49,120	24 hours
C. One-channel Public Broadcasting station	5,026	\$ 4,000,000	\$ 100,000	14 hours

Low-powered equipment also facilitates hands-on-use of the CenTeX system by educators and non-specialist camera and maintenance personnel.

2. The use of lower stability standards:

Upon the petitions of many educators, the second largest producer/distributor of educational films (A.I.T.) and several Public Broadcasting entities, the Federal Communications Commission has ruled that broadcasters of educational programming do not have to meet commercial broadcasting video blanking and stability standards.

CenTeX determined that, since teaching is primarily an information-transfer process, the use of lower stability standards in no perceptible way reduced learning effectiveness.

Thus, CenTeX uses this latter standard and makes use of 3/4" recording tape.

This decision:

- (a) reduces studio equipment and operating costs by 70% or more;
- (b) reduces personnel and other production costs by 70% or more;
and
- (c) makes curriculum evaluation-dictated and/or updating-revision-requirements easy and low-cost.

3. Maximum use of existing facilities and services:

Hundreds of thousands of construction dollars, many months of installation time and thousands of annual operating dollars were saved because the federally funded Project SETT-UP and its Virginia state-funded Project ITTS have made maximum use of existing facilities. The CATV circuits, the school-supplied land, offices and utilities, and the part-time use of top-flight instructors are indicative of how CenTeX has been able to use federally and state-funded equipments and CenTeX's interdisciplinary know-how and talents "in trade" for the otherwise very costly, hard-to-get assets of those needing CenTeX services. (Page 44 and following are some instances of the economy and increased distribution CenTeX's CIT-PEDS system gains as a result of using existing facilities and services.)

H. Keeping abreast of pertinent federal and state legislation and regulation:

The pertinent federal and state legislative and regulatory bodies are of basic significance to educational/medical/social services operation.

The following are but a few of the many instances where such jurisdictional entities directly affected the success of Project SETT-UP and continue to affect the productivity of its successor, Project ITTS:

1. At the state level:

- (a) Virginia's Public Broadcasting Station managers did their best to preclude CenTeX's entry into the educational telecommunications field, even though CenTeX delivery-system purposes were very different from those of PBS stations. The station managers feared that the implementation of CenTeX's cost-saving innovating concepts would attract state appropriation and local school dollars. However, after CenTeX precipitated a hearing with the Virginia House Education Committee, the Virginia General Assembly requested independent evaluation of CenTeX's research. House Documents No. 7 and 10 (1976) following this page resulted, and these gave weighty creditability to CenTeX concepts and started off the life-saving, continuing support of the Special Education Division and Mr. James T. Micklem.

**REPORT OF TELECOMMUNICATION
IN THE FIELD OF
SPECIAL EDUCATION**

**REPORTED TO
THE GOVERNOR
AND
GENERAL ASSEMBLY OF VIRGINIA**



HOUSE DOCUMENT NO. 7



COMMONWEALTH of VIRGINIA

STATE DEPARTMENT OF EDUCATION
RICHMOND, 23216

October 31, 1975

Honorable Mills E. Godwin
Governor
State Capitol
Richmond, Virginia 23219

Dear Governor Godwin:

Pursuant to requirements of House Joint Resolution 238 of February 7, 1975, the Department of Education in cooperation with a select statewide committee has reviewed the pertinent findings of The Center of Excellence, Inc., Williamsburg, Virginia regarding the practicality and effectiveness of the utilization of telecommunication in the field of Special Education.

This review, as outlined on the attached document, indicates the following broad areas of application:

1. direct instruction of certain handicapped children,
2. pre-service and in-service training of professional and paraprofessional personnel,
3. diagnostic and prescriptive services for handicapped children, and
4. information and guidance to parents of handicapped children.

Accordingly, the Department of Education is developing a proposal for submission to the U. S. Office of Education (Bureau of Education for the Handicapped) to test the effectiveness of telecommunication in these above referenced areas. Additional efforts are underway to coordinate such services for handicapped children in state and private facilities.

October 31, 1975

The technical feasibility of applying the findings of The Center of Excellence, Inc. is to be reviewed by the Virginia Telecommunication Council. This information will be provided by that agency in a companion report.

Sincerely,



W. E. Campbell
Superintendent of Public Instruction

WEC:pgd

cc: Honorable Carter Lowance
George L. Hall
John A. Curtis

STATE DEPARTMENT OF EDUCATION
RICHMOND, VIRGINIA 23216

Report from the Department of Education - As Required by H.J.R. 238

The following report constitutes a response to the Governor and the General Assembly of the Commonwealth regarding the "practicality and effectiveness of the increased use of telecommunications in the field of special education."

It is submitted to comply with a directive of the General Assembly contained in House Joint Resolution 238 (Hs. Amendments - February 7, 1975).

I. Pertinent Background Data

House Joint Resolution 238 directed the Department of Education -

- a. "to review the pertinent findings of the Center of Excellence, Inc. (Centex) a non-profit educational research organization in Williamsburg, Virginia."
- b. "if the Department deems it advisable, to develop a pilot program in cooperation with the Center to determine the practicability and the effectiveness of the increased use of telecommunications in the field of Special Education."
- c. "to conclude its studies and submit a report to the Governor and General Assembly not later than November one, nineteen hundred and seventy-five."

II. Collaborative research conducted by Department of Education staff and the Center of Excellence focused on the following areas:

- a. the telecommunications needs of Special Education and those of educational programs and processes in general;
- b. the various types of telecommunications systems which would likely be most effective and at the same time economically meet the telecommunications needs of general education, and in particular, those that impact on programs of education for the handicapped.
- c. the operational and fiscal requirements of an educational telecommunications system operating in the 2,500 - 2,686 Mhz band (The so-called ITFS band was established by the

Federal Communications Commission for exclusive use by non-profit educational organizations. It contains twenty-eight 6-Mhz channels which can be used for one and two-way telecommunications services and, may be used for the transmission of one or more of the following: transfer-audio, video-audio-T.V., computer center-access-and retrieval, and "hard-copy" transmission, such as facsimile).

- d. possible Federal funding for a pilot, test installation to determine the real usefulness, operating requirements, and costs of an education telecommunications system, designed specifically to serve Special Education needs and operating in the ITFS band.

III. Department of Education Actions and Findings

Regarding the four research areas noted above, the Department of Education undertook the following action:

- a. Utilization of telecommunications for the education of handicapped children:

A statewide committee was appointed who reviewed material developed by a Special Education Advisory Board appointed by Centex two years ago. This Board had representation from both public and private sectors, including public school programs, teacher training and state institution programs for handicapped children. This Board considered some 52 possible uses of telecommunications as applicable to the Special Education Programs. Of this number, 16 were selected as those most likely to be most significant. These items along with other ideas were reviewed by the State Committee, who were subsequently reduced to the following broad areas:

1. "direct child use/i.e. teacher-learner interaction and instruction."
2. "utilization as a resource for two professional training components:
 - a. pre-service instruction
 - b. inservice/continuing education for practicing teachers, administrators and support services personnel, and
3. information and guidance to the parents and family members of Special Children."

- b. Various types of telecommunications systems most likely to be useful and economically practical:

The State-appointed Committee saw value in the proposals and findings offered by Centex in that if determined to be technically sound and feasible by the Virginia Public

Telecommunications Council, the Centex recommended ITFS Systems should be developed and field tested to determine if it would best meet the telecommunications needs of Special Education for these reasons:

1. The ITFS band sets aside twenty-eight 6-Mhz channels for non-profit educational use. There are, therefore, a sufficient number of channels to provide a simultaneous distribution for the varying age-level needs of identified handicapped students.
2. In a letter dated September 29, 1975, the Federal Communications Commission, Dr. Robert L. Hillard stated the following:

"Section 605 of the Communications Act of 1934, as amended (copy enclosed) would indicate that it is illegal to receive an ITFS signal without approval of the licensee.

However, Commission authority under this section for illegal reception remains untested. A deterrent to unauthorized home reception of ITFS programming is, of course, the cost of the downconverter necessary..."

Since both the Centex Advisory Board and the State-appointed Committee concur that circuit privacy is a basic "must" of any telecommunications system that would be utilized, it is important that ITFS circuits have the privacy protection of a communications circuit...and are not open to general use (reception) as in the instances of current commercial and non-commercial broadcasting program distribution.

3. The ITFS rules permit the band to be used for two-way, interactive communications (as well as for one-way communications). Thus, the ITFS spectrum and its associated F.C.C. rules make it possible to use ITFS circuits for diagnostic-prescriptive services and for student or staff inservice training and in the observation of clinical intrusion by trainees or those in practicum upgrading courses. The two-way, interactive capabilities of the ITFS band, plus its multi-channel capacity and legal privacy protection, give the proposed Centex system the capabilities considered essential to an effective Special Education telecommunications system by the State-appointed study committee.
- c. Operational and fiscal requirements of an ITFS system designed for use by Special Education services:

Centex has estimated that the costs of a test system (engineering, equipment, installation, regulatory

requirement costs) with sufficient operating capability to determine the per-student cost effectiveness of its use, would range between \$200,000 and \$400,000, dependent on the type of services to be distributed. It has also been estimated that the annual operating costs for its projected systems would run between \$25,000 and \$35,000, dependent on system size and location.

d. Federal Funding:

Based on the above findings it was agreed that the Department of Education would initiate efforts to develop a proposal to seek funds from the U. S. Office of Education, Bureau of Education for the Handicapped to test the efficacy and economic feasibility of the above findings.

Accordingly in cooperation with the Department of Mental Health and Retardation and the Eastern Virginia Medical School, a proposal for the use of Federal funds has been developed and initiated by Centex with endorsement from the Division of Special Education that will test telecommunication applicability for education of the handicapped in another geographic area of the state. Subsequently, a proposal will be developed to include the school divisions located on the Middle Peninsula of Virginia which will be linked to the initial grant submitted by Centex.

If these grants are subsequently funded, it is anticipated that sufficient evidence can be obtained to determine the value of telecommunications in enhancing a total program of special education and related services to the handicapped children and adults in Virginia.

The Special Education Division of the Department of Education has, to-date fulfilled two of its three major assignments as directed under HJR 238 and is in the process of endeavoring to fill the third major component, namely "to develop a pilot program in cooperation with the Center for Excellence to determine the practicability and effectiveness of the increased use of telecommunications in the field of special education."

October 29, 1975

Item 5

A REPORT
REGARDING THE ESTABLISHMENT OF AN
INSTRUCTIONAL TELEVISION FIXED SERVICE SYSTEM IN
THE WILLIAMSBURG/HAMPTON AREA

REPORTED TO
THE GOVERNOR
AND
GENERAL ASSEMBLY OF VIRGINIA



HOUSE DOCUMENT NO. 10

234

COMMONWEALTH of VIRGINIA

Virginia Public Telecommunications Council
902 Ninth Street Office Building
Richmond, 23219
(804) 770-3153

October 31, 1975

CHIEF OF STAFF
GOVERNOR
THE HONORABLE MILLS E. GODWIN
AND CHIEF OF STAFF
THE HONORABLE MILLS E. GODWIN
GOVERNOR
THE HONORABLE MILLS E. GODWIN
GOVERNOR

HAROLD A. SPANER, JR. IN DEPARTMENT
OF PUBLIC UTILITIES
DR. WILLIAM H. HIGGINS, JR. IN DEPARTMENT
OF PUBLIC UTILITIES
DR. DAVID L. LEWIS, IN DEPARTMENT
OF PUBLIC UTILITIES
MRS. DONALD S. McCOMBS, IN DEPARTMENT
OF PUBLIC UTILITIES
A. MELVIN MILLER, ALEXANDRIA
DR. G. TYLER MILLER, HARRISONBURG
MRS. J. W. DEKORSHOUSE, ALEXANDRIA
MRS. E. J. L. PAUL, HARRISONBURG
RONALD W. HOP, DANVILLE
VINCENT J. THOMAS, NORFOLK
DR. ROBERT J. YOUNG, PAULINA

The Honorable Mills E. Godwin, Governor
State Capitol
Richmond, Virginia 23219

Dear Governor Godwin:

Pursuant to the House Joint Resolution No. 238 of February 7, 1975, the Virginia Public Telecommunications Council has reviewed the pertinent technical findings of the Center for Excellence, Inc., Williamsburg, Virginia, regarding the establishment of an Instructional Television Fixed Service (ITFS) distribution system in the Williamsburg/Hampton area, for the purpose of providing diagnostic and instructional services for profoundly or severely handicapped youth.

The Virginia Public Telecommunications Council's review of the pertinent findings (see attached documents) indicates that the proposed program is technically feasible, if the following assumptions on the part of the Center for Excellence prove correct:

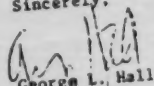
- 1) the Federal Communications Commission will accept a proposal for an ITFS system containing a mobile transmitter;
- 2) suitable transmitter locations and mobile transmitter sites can be identified.

Cost projections for the technical requirements of Phase One of the Project seem to be accurate; however, it is the recommendation of the VPTC that a more detailed description of technical services to be required in Phase Two of the project would need to be formalized before the initial phase were actually undertaken.

The Honorable Mills E. Godwin, Governor
Page 2
October 31, 1975

Determination of the potential cost-effectiveness of such a technical system in reaching the instructional objectives of the Department of Education must, of course, be provided by that agency in a companion report.

Sincerely,


George L. Hall
Director

GLH:cnw

Attachments (3)

cc - Secretary Maurice B. Rowe
Secretary Carter O. Lowance
Dr. W. E. Campbell
Mr. James T. Micklem, Sr.
Mr. John A. Curtis

MEMORANDUM

TO - Mr. George L. Hall, Director
Virginia Public Telecommunications Council

FROM - William C. Lewis
Technical Consultant
The American College of Life Underwriters

TOPIC - Project Special Delivery

September 1, 1975

On July 17, 1975 I met with Mr. John Curtis, Mr. Joel Fleming, and Mr. Jules Cohen in Washington, D. C. to review the plan for Mr. Curtis' proposed project, "Special Delivery". I must say that the meeting was most useful and helpful and I believe that both Mr. Fleming and I came away with a better idea of just where the project presently stands.

While the materials previously forwarded to you and which I reviewed were quite detailed and outlined a very ambitious plan, it is my understanding now that these materials look far into the future and assume that a number of definitive and carefully planned success have led to the ultimate system. As I advised you after my initial review, there is little in the way of a definitive technical plan in the original document.

The present plan is to seek funding for a pilot program making use of a minimal technical system to determine the feasibility of utilizing two-way television for teaching and otherwise working with profoundly/severely handicapped youth.

The technical characteristics of the system can be described as follows:

- a. The system will be a single channel system. It is so defined as it provides availability of a single viewable channel at any viewing location.
- b. The system will operate two transmitters located about 15 miles apart and thus covering an area approximately 15 by 45 miles. One transmitter will be designated as prime originating station and the second transmitter will operate as a satellite of the first. Either transmitter might be designated prime with the other being the satellite as desired.
- c. A single mobile origination unit will be apart of the initial system. This unit will provide a relay of materials from a remote location to the prime transmitter only.
- d. The initial receiving sites will be limited to 10 in-school locations. The reception of transmissions in homes will be part of a later phase of the system development.

Mr. George L. Hall
Page 2
September 1, 1975

Assuming the four characteristics of the system as described above, and referring to the rough coverage map provided by Mr. Curtis you should be aware of the following operational patterns of the proposed system.

There is a definite overlap in the coverage of the two stations. In that area, a choice can be made as to which station should be viewed by a receiving location. When the mobile unit is operating in the area covered by both stations, it too has a choice of which location to transmit it's signal to for relay.

If only one station is designated as a prime station, for example the Williamsburg location, the operational range of the mobile unit will be confined roughly to the coverage area of that station.

It should be noted that every time the mobile unit moves, the antenna at the relay receiver must be re-oriented for proper reception. This could entail some detailed and problematical antenna study work be done based on the desired operating area for the mobile unit.

Some thought must be given to establishing receiving locations in the indicated area so as to minimize effects of high trees, buildings and other obstructions.

The necessary budget to establish the pilot project can be summarized as follows. These figures are taken from the project documentation supplied by Mr. Curtis and while these costs seem reasonable, delay in implementing the project may result in normal inflation showing in the final costs of the project.

These costs assume the higher engineering figures but do not include the acquisition of land or construction of transmitting towers. It seemed that Mr. Curtis was confident he would find approval to place transmitting antennae on existing structures.

CAPITAL COSTS

2 fixed transmitting stations	\$41,045.00	\$ 82,090.00
10 Receiving locations equip.	2,463.00	24,630.00
1 Mobile Transmitter	27,700.00	27,700.00
1 Mobile studio package	35,510.00	35,510.00
1 Vehicle	27,500.00	27,500.00

TOTAL \$197,430.00

Mr. George L. Hall
Page 3
September 1, 1975

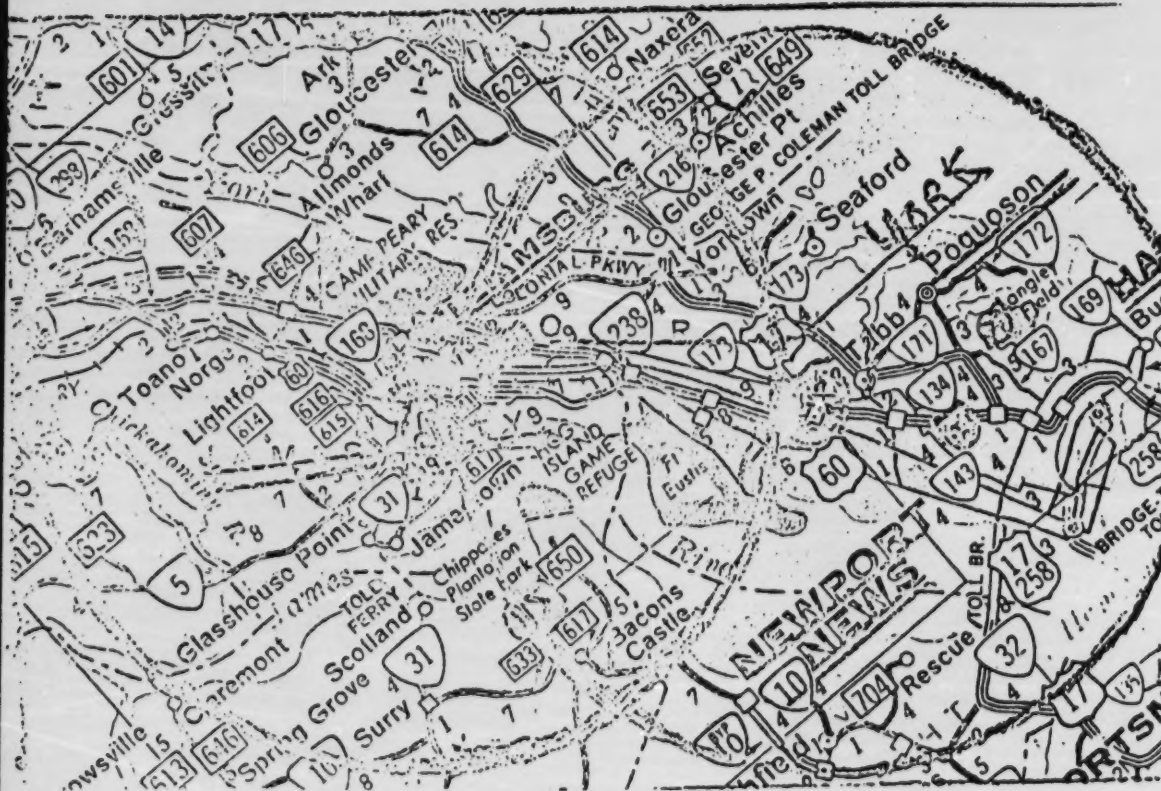
ANNUAL OPERATING COSTS (Less personnel)

General Maintenance	\$ 8,000.00
Operating Costs	<u>16,387.00</u>
	\$25,887.00

I conclude and must advise you that from the data presented and after consideration of various materials that I see no technical reason why the system as described will not operate. There are a number of details that will have to be cleared up however before we can put the system into operation.

Other than considering the cost of the system when spread over the population and defining the actual population in the area to be covered which are obvious, the FCC must approve the operation of the mobile transmitter in the ITFS band. There is some question on this matter.

I would also advise that before the pilot proposal is approved that a more firm phase 2 plan be developed indicating the costs for additional channels of operation, additional transmitter sites and additional receiving locations. In other words, a system projection of equipment, service, message traffic and costs should be made before embarking on the initial phase.



WILLIAM C. LEWIS

Communication System Consultant/P.O. Box 412 Dover, Delaware 19901/302/678-1112

1 October 1975

Mr. George L. Hall
Virginia Public Communication Council
Ninth Floor
Ninth Street Office Building
State of Virginia
Richmond, Va.

RE: Center for Excellence

Dear Mr. Hall:

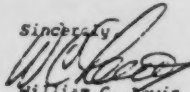
The enclosed letter from Mr. John Curtis confirms the setting forth of the Center For Excellence as being correct as I have been able to ascertain from reading Mr. Curtis' documents and from meeting with Mr. Curtis and Mr. Cohen. Please add it to my prior report for your records.

In summary I can advise you that the I.T.F.S. system as set forth and proposed by the Center For Excellence is certainly feasible from a technical standpoint. The full costs of such a system will, of course, only be fully understood when an actual system begins to evolve on the drawing board. As with any system operating in that frequency band considerable planning must go into facilities for transmitters and receivers.

On the other hand, while the use of I.T.F.S. technologies is possible for this application I am of the opinion that there are some alternate transmission techniques such as CATV, Video Cassette, etc., which may provide adequate capabilities for less dollar outlay than I.T.F.S. systems. Certainly a part of any implementation proposal should be a complete study of all available options for message delivery.

Thankyou very much for participating in this project. I look forward to working with you again in the future.

Sincerely,


William C. Lewis



- (b) Since 1976, CenTeX has played a major role in two more telecommunications investigations directed by the Virginia General Assembly, and now, for the first time, the Virginia Department of Telecommunications is cooperating with CenTeX and has included funding for CenTeX in its next biennium budget (which begins on July 1, 1982).

2. At the federal level:

- (a) Federal Communications Commission regulatory actions:

CenTeX's SETT-UP telecommunications system concept is innovative. Therefore, its licensure by the FCC required modification of FCC regulations. CenTeX secured these regulatory modifications. Its mobile station (which makes economically practical home-delivered psycho-medical and educational services, such as those for teenaged pregnant school children) is still the only such licensed vehicular station in the ITFS field.

- (b) The U.S. Congress:

CenTeX visitations to the Congress and the presentation of Project SETT-UP-based information helped to modify the Federal Public Facilities Financing Act, to include grants for ITFS operators.

Already, this modification has provided 75% of the funding required to build two of CenTeX's five ITFS stations.

When the Reagan advisors eliminated all funding by this Act, CenTeX and other organizations testified before the Senate (Goldwater) Telecommunications Subcommittee. Results: the desired appropriation was reestablished.

I. Backing a readily identifiable "growth area" for initial service development:

CenTeX chose to concentrate on Special Education because its 1973/1974 needs-assessment studies and those of Virginia's State Department of Education made it quite evident that this educational area had unfilled education needs of magnitude.

However, CenTeX did not know at the time of this decision that it was tackling a "popular" area which became the recipient of ever-increasing federal funding and state legal, as well as educational, significance. P.L. 94-142, of course, pushed CenTeX's telecommunications delivery-system concepts to a higher-than-ever-before level of funding interest.

It has now become obvious that CenTeX-type two-way systems are ideal for interactive teleconferencing, for all types of professional training and for total family educational/medical/social services programming. (The next page indicates the importance of continuing professional training.)

States that Require Professionals to Continue Their Education

	Cent. of public accountants	Architects	Dentists	Engineers	Lawyers	Nurses	Nursing home administrators	Optometrists	Psychologists	Physical therapists	Pharmacists	Physicians	Real-estate personnel	Social workers	Veterinarians
Alabama															
Alaska															
Arizona															
Arkansas															
California															
Colorado															
Connecticut															
Delaware															
Dist. of Col.															
Florida															
Georgia															
Hawaii															
Idaho															
Illinois															
Indiana															
Iowa															
Kansas															
Kentucky															
Louisiana															
Maine															
Maryland															
Massachusetts															
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Minnesota															
Mississippi															
Missouri															
Montana															
Nebraska															
Nevada															
New Hampshire															
New Jersey															
New Mexico															
New York															
North Carolina															
North Dakota															
Ohio															
Oklahoma															
Oregon															
Pennsylvania															
Rhode Island															
South Carolina															
South Dakota															
Tennessee															
Texas															
Utah															
Vermont															
Virginia															
Washington															
West Virginia															
Wisconsin															
Wyoming															

• Mandatory for state registration
 • Mandatory for state licensure
 • Mandatory for state certification

SOURCE: LOUISE K. PHILLIPS, JOHNS HOPKINS UNIVERSITY

J. Make by-product multiple use of grant-developed assets and service development:

Professional in-service training is a continuing and growing field in a fast-changing service-oriented society (see the preceding page). That is why CenTeX continues to use its SETT-UP- and ITTS-developed know-how to extend types of professional inservice training.

Because the initial design of the CenTeX system gave effective consideration to CenTeX's long-term need for "new market" penetration, it expects next year to add the delivery of health professional training to its list of income-producing services.

Further, it hopes to sell to federal and state agencies the part-time use of its uniquely qualified Applications Research Laboratory, which was initiated to serve many different types of disciplinary and equipment application research requirements.

K. Use grant-developed products to store up dollars for the "rainy days":

Two examples of this recommended consideration are summarized on the following two pages.

One of these shows the college-level tuition-credit by-product productivities which Projects SETT-UP and ITTS have enabled CenTeX to develop for the universities whose facilities support CenTeX's curriculum development programs.

Obviously, such income has created goodwill for CenTeX and has enabled CenTeX to use college/university facilities (as well as faculties) on no-cost or low-cost bases.

The second one illustrates how the good product often sells itself by word of mouth nationally, thereby creating unexpected income. In such instances, CenTeX puts income in a separate account which can be used only to defray the costs of reproducing copies of the purchased tape and curriculum materials, and for the updating of courseware tapes and materials.

CenTeX is currently endeavoring to eliminate material requiring privacy protection from some of its SETT-UP tapes so a direct-mail selling effort can be made for groups of SETT-UP tapes and materials.

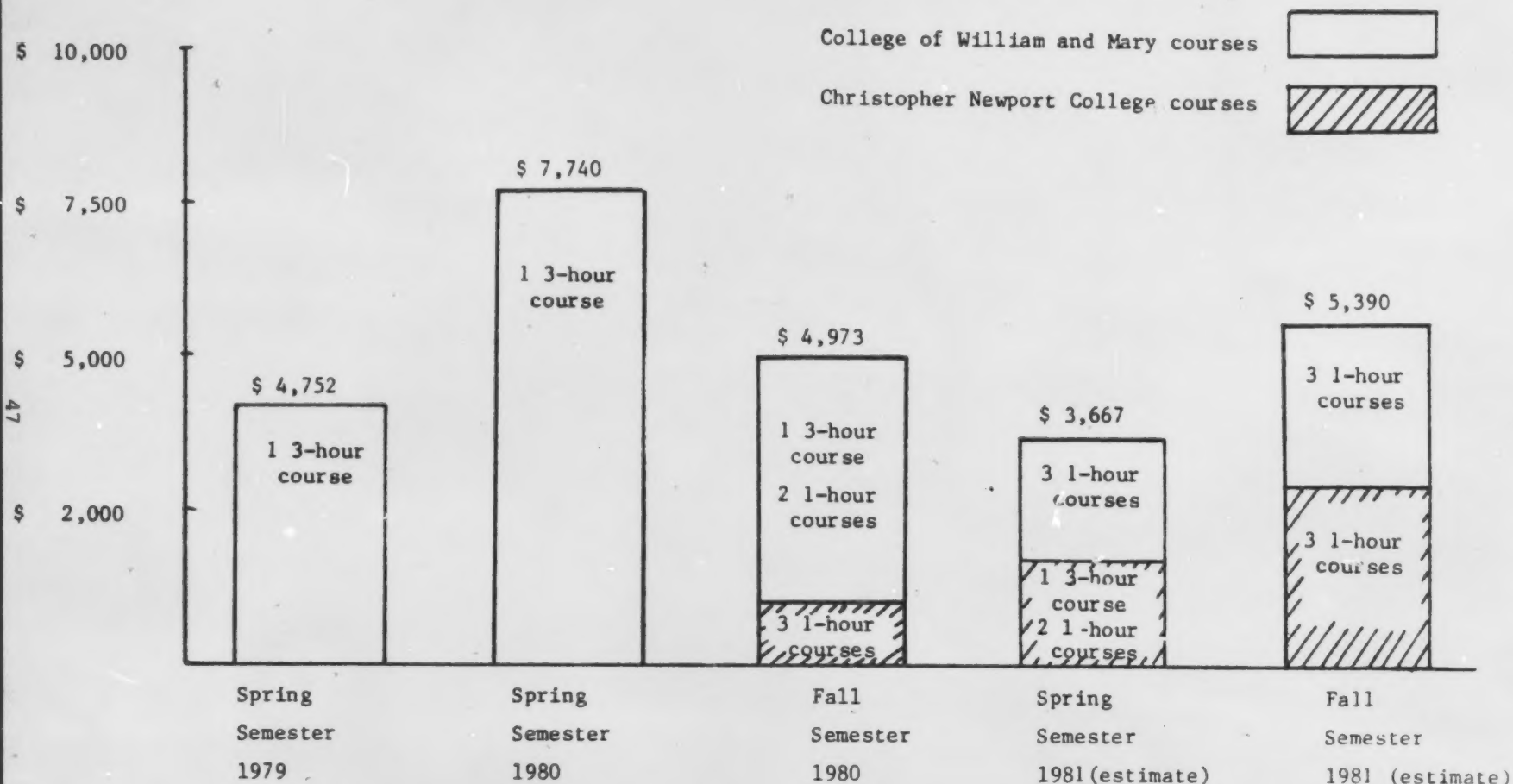
L. Recognize and record project learning for easy access by others:

Though innovative, the CenTeX CIT-PEDS and SCS systems are designed for low-cost operation and easy maintenance and use. It is even more important that these systems can be (and are being) replicated throughout the nation.

It is important, too, to realize that two-way, multi-media, multi-service, privacy-protectable educational/medical/social services

COLLEGE TUITION PAYMENTS BY SEMESTER:

CENTEX TELECOMMUNICATIONS DELIVERY SYSTEM



Total Tuition Payments through Fall 1980 (including experimental course in Fall 1978): College of William and Mary - \$18,428; Christopher Newport College - \$333. Total Tuition Payments including 1981 estimates: College of William and Mary - \$23,268; Christopher Newport College - \$4,550; Total - \$27,818.

GETT-UP TAPE MARKETING PROGRAM

Shipping Date	Purchaser	Session(s)	Fee
12-80	Ferguson Reorganized School District *Ferguson, Missouri	All Sessions	\$4,125
12-80	Bd. of Jewish Education of Greater NY	7	350
12-80	Independent School Dist. #283 *St. Louis Park, Minnesota	9	350
7-81	State Dept. of Education *Boise, Idaho	3,4,5,8,9,10,11,12,13,15	\$2,950
12-81	School District 91 Idaho Falls, Idaho	6,7	700
10-81	Joint School District No. 2 *Meridian, Idaho	1,2,14	1,050
13-81	Bd. of Education *Northport, L.I. New York	6,8,9,10,12,13,14,15	2,600
15-81	Buncombe County Bd. of Education *Asheville, North Carolina	All Sessions	4,125
18-81	Regina R. C. Separate School Div. #81 *Regina, Saskatchewan	8	350
18-81	Dept. of Education *Juneau, Alaska	All Sessions	4,125
12-81	Marquette-Alger Int. School Dist. *Marquette, Michigan	10	350

Total income received as of 8/31/81 - \$21,075

Estimated total cost to date (9/4/81) - approximately \$16,000

telecommunications delivery systems are a new educational tool. It is, therefore, important to record and make readily available to others any basic operating principles developed by a grant-enabling project, like Project SETT-UP.

Here are some of the cardinal principles developed jointly by the BEH/Virginia Department of Education/CenTeX team and Projects SETT-UP and ITTS.

1. Cardinal principle number one:

Educational/medical/social services TELECOMMUNICATIONS is not telecommunications. Rather, it is, in fact, a PROCESS in which properly utilized telecommunications can be a major component to accomplish significant educational results.

2. Cardinal principle number two:

Being a process--not a discipline unto itself--the proper use of educational/medical/social services telecommunications requires an interdisciplinary team, directed on a coordinated basis to a preselected target for which preproject goals, checkpoints and evaluation procedures have been previously set.

3. Cardinal principle number three:

By breaking the current shackles which geography and time impose on America's educational/medical/social service processes, the intensive use of modern, two-way, privacy-protectable, low-cost telecommunications delivery systems can effectively multiply and increase by an order of magnitude the quality, scope and consumer-usefulness of America's educational/medical/social services.

M. Project SETT-UP's BOTTOM Line

1. The CenTeX CIT-PEDS Network:

Network is actually four separate telecommunication systems--each designed to use the most efficient, least costly telecommunications methodologies to accomplish one or more public-service objectives--but coordinated and operated by a single management which would normally be employed to operate any single one of the four distinct systems.

System Number One: A series of five local broadcasting stations established for local use by the individual school divisions participating in the CenTeX program.

Currently, there are in Tidewater five local broadcasting stations using both over-air microwave and cable TV circuits to reach their school locations. (There are two more such stations scheduled for installation: one in Richmond; the other in Petersburg.)

Of the five stations, four (King William County, West Point, Williamsburg and Newport News) have been in operation for several years, while the fifth, in Virginia Beach, is scheduled to go into full operation in May 1982.

The primary public services of these stations as they are currently being used by the local school divisions are:

- (a) to deliver two-way teleconferencing between central office school administrators and their remotely located school managements and teachers;
- (b) to deliver specialty programming and support services from a central location to remotely located school locations and personnel;
- (c) to deliver school-student developed programming; and
- (d) to collect local resources, such as teaching expertise and materials, for retransmission via the CenTeX Tidewater network and for use by other schools participating in the resource-exchange system made possible by the CenTeX network.

In brief, this CenTeX system component literally gives each of the participating school divisions its own broadcasting facility for such services as they wish to generate themselves or to take off the CenTeX microwave network for local distribution. (Most participating school divisions also provide to neighboring school divisions some of the available broadcast time so that these divisions also have the usefulness of both self-generated and network-generated teaching expertise and materials.)

System Number Two: CIT-PEDS: The CenTeX Multi-Media, Multi-Service, Two-Way Network, "from the Atlantic Ocean to Richmond, the Capital City"

Operating on a different set of channels, CenTeX operates a network which begins in Virginia Beach and ends in Richmond. By using a combination of available telecommunications methodologies (microwave, CATV, telephone lines) and privacy-protection circuitry, (plus its mobile station), this network is designed specifically:

- (a) to provide two-way circuits for the delivery of professional training and continuing educational services such as in-service teacher and medical practitioner training; and for remotely delivered medical consultation and diagnostic services; and for social services, such as information and continuing education for teenaged, school students;
- (b) to deliver tuition-based college-level courseware; and

- (c) to enable a single instructor or practitioner from a central point to maintain two-way audio-video (or two-way audio-video out and audio-only return) to any station and/or other distribution component (such as CATV) associated with the multi-media CenTeX matrix of delivery systems. Currently, this system is serving 13 school divisions and 118 school locations.

This network today serves areas having 23.3% of Virginia's total population, 14,436 of its school teachers and 272,717 school-aged children; and will, when its Backbone is completed, be reaching areas with 34% of Virginia's total population, 20,820 of its teachers and 384,664 of its school-aged children.

System Number Three: The CenTeX CATV Network

With no privacy circuitry restrictions, the CenTeX CATV network today reaches all the CATV subscribers served by Tidewater's major CATV operations (approximately 302,400 persons) and is expected to reach approximately 644,000 persons by mid-1982.

System Number Four: CenTeX's Subcarrier/CATV Broadcasting System for the Sensory-Deprived

By combining the use of the subcarrier of commercial and/or public FM broadcasting stations with CATV FM channels, this network is:

- (a) Virginia's first broadcasting service for visually handicapped;
- (b) Virginia's first broadcasting service for the hearing impaired; and
- (c) the first in America to broadcast via a single FM station the programs required to serve all five of the major sensory-deprived populations (the visually impaired, the hearing impaired, the deaf-blind, the aged and the homebound).

NOTE: None of the above populations include the minimum 5,000 non-Tidewater Virginia teachers which the State Department of Education estimates will view CenTeX tapes and materials distributed by the state tape distribution system; nor those teachers viewing CenTeX tapes via Public Broadcasting Station distribution; nor those teachers viewing CenTeX-produced tapes purchased by non-Virginia-located jurisdictions. (See following pages.)

2. CenTeX's Eventual Self-Supporting Capabilities:

From its inception, the system goals and strategies for the CenTeX Four-System CIT-PEDS Network have included as one of their objectives the ability to generate its own self-supporting capability.

This economic viability goal still appears practical. In other words, once the CenTeX Tidewater Backbone is completed, this Tidewater-area CenTeX network will generate sufficient user-income:

- (a) to pay for its operation; and
- (b) to pay for the amortization of its equipment.

The preceding projection is based solely on the funds which use of the completed system can save from the current budgets of local schools and two major state agencies which have, in association with CenTeX, made the cost-saving studies on which the preceding projection is based.

3. The Expansion of the CenTeX Multi-Media, Multi-Service, Multi-Origination Point, Privacy-Protectable, Low-Powered, Four-System Network to Benefit Virginia and the Nation:

CenTeX studies indicate that, if Virginia is divided into five specific operating areas (one of which is Tidewater), at least three of these five areas can duplicate both the unique, important public services and the economical viability projection which have been a part of the CenTeX four-system concept since its initiation in the Commonwealth.

Much of the CenTeX four-system network is, for instance, already being duplicated in other states, including California, Texas and South Carolina.

Let's, therefore, hope Virginia will increase the scope and quality of its educational/medical/social services by having the CenTeX Tidewater Four-System CIT-PEDS Network initiated in all parts of the Commonwealth. The map on the following page outlines the recommended next steps designed to establish CIT-PEDS in areas having more than 70% of Virginia's total population.

This 70% of Virginia's population includes:

- (a) 1,169,011 of Virginia's school children;
- (b) 63,596 of its teaching personnel;
- (c) 58,817 of its health personnel; and
- (d) 4,640,494 of its citizenry.

COMMONWEALTH of VIRGINIA

DEPARTMENT OF EDUCATION

P. O. BOX 60
RICHMOND, 23216

November 14, 1980

Mr. John Curtis
Founder and President
Centex
P. O. Box 158
Williamsburg, Virginia 23185

Dear Mr. Curtis:

Thank you for the outstanding instructional and technical work which you and your staff coordinated to develop the GETT-UP series. As you are aware, those who work with gifted and talented students are excited about the potential utilization of this series for inservice education.

During the first month of distribution through the Department of Education's Audio-Visual Service, one hundred and forty program tapes have been duplicated and sent to requesting school divisions. I believe that we could modestly anticipate that one thousand teachers will view this series during the first year of circulation. Because of the demand for professional development in gifted education, I would anticipate that the present rate of teacher utilization will continue for the next five years.

With the anticipation of one thousand teacher "viewings" per year for the next five years, the cumulative impact of this thirty-six program series could reach one hundred and eighty-six thousand contact hours. Even though this projection is based upon a very limited sample, appropriate "field" awareness could significantly increase the professional viewing audience.

As you begin to develop the GETT-UP II series, please extend my thanks to your staff for the quality of work which they have produced. I look forward to working with you on many more projects. If you have questions related to these projections, please call us.

Sincerely,

William C. Boshier, Jr.

William C. Boshier, Jr.
Administrative Director for
Personnel and Professional Development

WCB:dj

THE ESTIMATED CURRICULUM IN-SERVICE, PER-HOUR TEACHER
VIEWING COSTS OF CENTEX-PRODUCED CURRICULA (1)

11-19-80

Category and Viewing Usage Per Tape Per Year	COST DATA (2)					
	Per Teacher Viewing-Hour		Per Teacher One College-Credit-Course Hour		Per Teacher Three College-Credit-Course Hours	
	Amortized over a one-year period	Amortized over a five-year period	Amortized over a one-year period	Amortized over a five-year period	Amortized over a one-year period	Amortized over a five-year period
1. High-Interest Course (3) GETT-UP 39 Tapes, 1000 viewings	\$ 2.05	\$ 0.41	\$ 32.80	\$ 6.56	\$ 80.00	\$ 16.00
2. Medium-Interest Courseware (4) ITTS I and ITTS II 384 Tapes						
a. 750 viewings	1.56	0.31	25.12	5.02	60.28	12.06
b. 500 viewings	2.35	0.47	37.68	7.54	90.42	18.08
3. Specialized/ Regional-Interest Courseware (4)						
a. 250 viewings	4.71	0.94	75.35	15.07	180.84	36.17
b. 100 viewings	11.77	2.35	188.38	37.68	452.10	90.42

- (1) Estimated one- and anticipated five-year per tape viewing hours have been estimated by Dr. Wm. C. Boshier, Administrative Director for Personnel and Professional Development, Virginia State Department of Education.
- (2) Curriculum cost data are based on the actual current costs of CenTeX-produced curricula modules funded by Virginia State Department of Education and Federal educational agencies. High-Interest Courseware are Federally-supported programs, requiring nationally recognized experts from all over the U.S.A. and include their travel costs. The costs in Medium-Interest and Specialized/Regional-Interest Courseware are for state-supported programs, which use Virginia-located instructors.
- (3) Cost is based on three-hour, college-credit curriculum courseware production of \$80,000; tape duplication costs are borne by the Virginia Department of Education on tape supplied by local school systems.
- (4) Cost is based on certificate-renewal and college-credit curriculum courseware production costs of \$226,061 for 12 one college-credit courses; tape duplication costs are borne by the Virginia Department of Education on tape supplied by local school systems.

ferguson

Walnut Grove School
P.A.C.T. Program

florissant

1248 N. Florissant Road Ferguson, Missouri
Parents Assisting as Children's Teachers

schools

63135 595-2372

December 4, 1980

Mr. John Curtis, President
Centex
Box 158
Williamsburg, Virginia 23185

Dear John:

Merry Christmas. You'll now be fixed for the next golf season with your very own personalized golf balls. It's about time. I ordered these as soon as I returned from my trip and just got them 2 weeks ago. Sorry to be so long in saying Thanks for a wonderful time. I can't wait to do it again.

We're as busy as ever and looking forward to relaxing over the Christmas holidays. We get two full weeks off. So, if I can get my year end reports all finished by the 15th. I can play around the house for awhile. My new daughter-in-law and I plan to make a few cookies.

Tell everyone hello. We're thinking about you back in Missouri.

Love,

Harley King

CENTER FOR EXCELLENCE, INC.

TELECOMMUNICATIONS DISSEMINATION MODEL (TDM) SELF-GENERATION CAPACITY

	<u>CETT-UP</u> ⁽¹⁾	<u>CETT-UP 11</u> ⁽²⁾	<u>TOTAL</u>
<u>Year 1</u>			
Number of Sets	10	10	20
Total Revenue	\$ 41,250	\$ 21,000	\$ 62,250
Less Costs ⁽³⁾	33,750	16,000	49,750
Surplus ⁽⁴⁾	7,500	5,000	12,500
<u>Year 2</u>			
Number of Sets	15	15	30
Total Revenue	\$ 61,875	\$ 31,500	\$ 93,375
Less Costs ⁽³⁾	50,625	24,000	74,625
Surplus ⁽⁴⁾	11,250	7,500	18,750
<u>Year 3</u>			
Number of Sets	20	20	40
Total Revenue	\$ 82,500	\$ 42,000	\$124,500
Less Costs ⁽³⁾	67,500	32,000	99,500
Surplus ⁽⁴⁾	15,000	10,000	25,000
<u>TOTAL</u>			
Number of Sets	45	45	90
Total Revenue	\$185,625	\$ 94,500	\$280,125
Less Costs ⁽³⁾	151,875	72,000	223,875
Surplus ⁽⁴⁾	33,750	22,500	56,250

(1) 15 sessions.

(2) 10 sessions (completed by July 1981)

(3) Costs recovered include use of ITFS system, studio, mobile van and editing equipment for curriculum delivery, evaluation, field testing, and tape editing; written materials preparation; and costs of tape stock, duplication, shipping and handling, royalties, and general overhead.

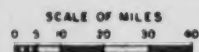
(4) Reserve placed in a restricted account to be used for curriculum updating and for the start-up marketing costs of future project products.

COMMONWEALTH OF VIRGINIA

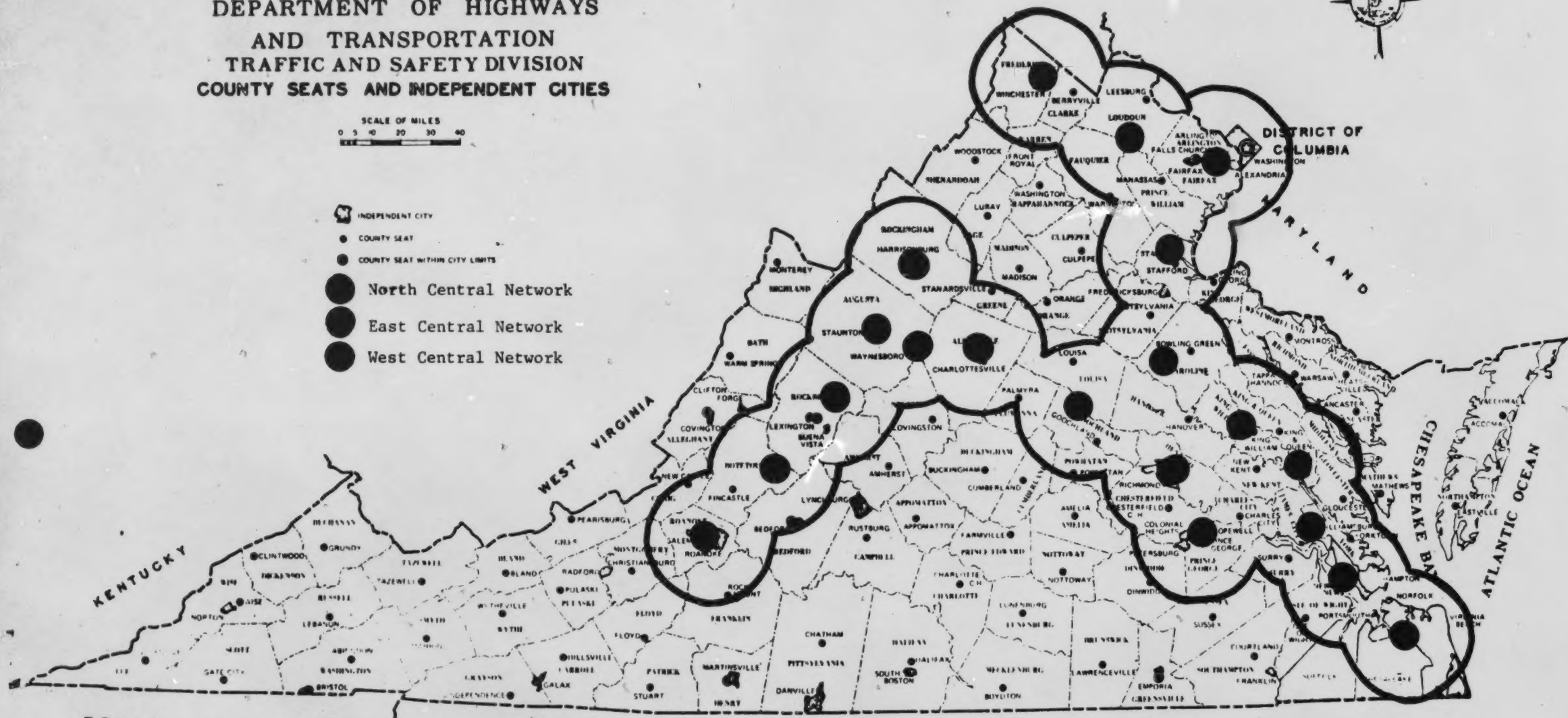
DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

TRAFFIC AND SAFETY DIVISION

COUNTY SEATS AND INDEPENDENT CITIES



- INDEPENDENT CITY
- COUNTY SEAT
- COUNTY SEAT WITHIN CITY LIMITS
- North Central Network
- East Central Network
- West Central Network



4. Why the Expansion of the CenTeX Four-System CIT-PEDS Network is So Important to Virginia and the Nation

Previous parts of this report clearly document the usefulness, the learning- and cost-effectiveness of the CenTeX four-system CIT-PEDS Network.

But what do those who have funded and used CIT-PEDS believe about its usefulness and its importance?

For funder and user evaluations regarding the usefulness and importance of the CenTeX four-system CIT-PEDS Network, see the following pages.

Also, please ask yourself this question: how many federal, and/or state, and/or local school-funded projects are cited and honored by their pertinent state legislatures for their public-service innovations? (For one such instance, see the following page, which reproduces the Virginia General Assembly's 1980 congratulatory resolution regarding CenTeX's public-service contributions.)

COMMONWEALTH OF VIRGINIA



GENERAL ASSEMBLY

HOUSE JOINT RESOLUTION NO. 37

Congratulating the Center for Excellence, Inc.

WHEREAS, the Commonwealth of Virginia has long been committed to providing life-enhancing as well as life-sustaining services to the handicapped, the elderly, and the homebound and to furthering continuing professional education programs; and

WHEREAS, economic realities increase our recognition that these services can only be provided through the cooperative efforts of government agencies and concerned and compassionate private citizens; and

WHEREAS, the Center for Excellence, Inc., a private, nonprofit educational research organization, has for seven years been dedicated to disseminating vitally needed educational, medical, and social service information to the deaf, the blind, and the homebound, and to developing and distributing programs to improve the skills of educators and other professionals; and

WHEREAS, the Center for Excellence, Inc. established the first station in Virginia to provide two-way telecommunications to these populations; and

WHEREAS, John A. Curtis, the founder and current president, and the other members of the Board of Directors of the Center for Excellence, Inc. have selflessly contributed of their energies and expertise by taking time from their demanding professional lives to serve the Center for Excellence, Inc. without receiving any remuneration; and

WHEREAS, the Center for Excellence, Inc. has developed a two-way educational telecommunications network, which, when completed, will encompass an area between Norfolk and Richmond, thereby serving one-third of the people of the Commonwealth; and

WHEREAS, the Center for Excellence, Inc. has perfected many sophisticated telecommunications methods, including systems to allow broadcasts to be relayed to select audiences, ensuring the privacy of the viewer and the suitability of the transmission; and

WHEREAS, the Center for Excellence, Inc. has received the support and endorsement of the Virginia Commission for the Visually Handicapped, the Virginia Council for the Deaf, the Virginia Department of Health, the Virginia Department of Education, the Virginia Department of Rehabilitative Services, and the Virginia Department of Mental Health and Mental Retardation; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Center for Excellence, Inc. be congratulated on its many contributions in expanding the scope of information delivery services to isolated populations in Virginia; and, be it

RESOLVED FURTHER, That the Clerk of the House of Delegates prepare a copy of this resolution for presentation to the Center for Excellence, Inc. in token of the esteem in which it is held by the General Assembly and by fellow Virginians.

*Agreed to by the House of Delegates,
February 27, 1980*

J. H. Hallman Jr.
Clerk.

*Agreed to by the Senate,
February 25, 1980*

J. T. Shipshure
Clerk.



DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
OFFICE OF EDUCATION
WASHINGTON, D.C. 20540

Bureau of Education
for the Handicapped

June 26, 1979

John A. Curtis
Founder/Chief Operations Officer
Center for Excellence, Inc.
P.O. Box 158
Williamsburg, Virginia 23185

Dear Mr. Curtis:

The Division of Personnel Preparation, Bureau of Education for the Handicapped has financially supported one project from the Center for Excellence, Inc. since June 1, 1976. This is Project SETT-UP or Special Education via Telecommunications: Teacher Upgrade with you as project director.

The basic objective of the project is to demonstrate in the Peninsula area of Virginia that the intensive use of telecommunications can provide and deliver effective inservice special education teacher training programs from a central location. This training is provided to remotely located classrooms at times conducive to inservice teacher attendance and at a per--in-service-teacher cost that is within the limits of current budgetary constraints and current methodologies.

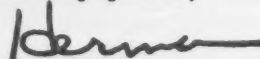
The CenTex project SETT-UP system utilizes ITFS circuits as its basic telecommunications methodology. However, its ITFS system includes the use of CATV and telephone-line conferencing circuits when either of these circuitries is useful, when the need for non-video return circuits is evident, or when cost considerations justify the use of these systems.

Data from the evaluation of the project has shown that it has far exceeded its goals. Many more teachers and administrators received training than originally was anticipated. Project SETT-UP has demonstrated unequivocally its usefulness in implementing Public Law 94-142, The Education for All Handicapped Children Act. One of the greatest benefits has been the close collaboration between the Federal, state, local, and private sector which you have been able to pull together in this joint effort.

over the years that we have worked with CenTex we have found that your management and training staff are of the highest caliber and integrity. That was one of the primary reasons for our initial funding of Project SETT-UP. With the extensive background and experience in the telecommunications field that CenTex has you should be capable of managing, directing, and evaluating other innovative efforts similar to the project.

Should anyone ever have questions concerning the performance capability of CenTex in this area of training via telecommunications please feel free to have them call me at 202 245-9431. Best wishes to you and your staff for a wonderful summer.

Sincerely yours,



Herman Saettler, Chief
Western Region and Special
Projects Branch
Division of Personnel Preparation

2. We believe that once other state Special Education departments learn what CenTeX system concepts can do for them, they, too, will become as supportive as we in Virginia have been, and they, therefore, will be willing to share the funding requirements necessary to maintain continuance and expansion of CenTeX's Special Education services. Their so doing, of course, would not only increase the availability of superior teaching expertise, but would also reduce the individual contributions that would be required if a single state had to pay the whole "bill" alone.

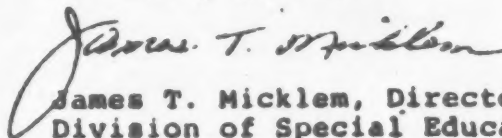
I have stated the preceding only because my acceptance of the proposed CenTeX assignment is based solely on the belief that so doing will directly benefit the Commonwealth of Virginia and is solely based on the high regard that the staff of Virginia's Division of Special Education Support Services has for CenTeX programs.

Though I appreciate the fairness of the suggestion that CenTeX might pay the Commonwealth for that portion of my time spent on assignments of the Jurisdictional Policy and Requirements Board, I must reaffirm that the technical assistance that I provide CenTeX has been, and will continue to be, spent only in anticipation of benefits of significant value to the Commonwealth. It would, therefore, be inappropriate for any compensation--even indirectly--to be associated with my continued participation in CenTeX programs.

Special Education in Virginia has already benefited significantly from CenTeX's programs, and I am confident that the Center for Excellence, Inc., will continue to make substantial contributions to the welfare of Virginia's Special Children.

I, therefore, accept with pleasure the challenges of your invitation to head the Jurisdictional Policy and Requirements Board, and am willing to give the personal time and effort required by this assignment.

Sincerely yours,



James T. Micklem, Director
Division of Special Education
Support Services

JTM/nb

COMMONWEALTH of VIRGINIA

DEPARTMENT OF EDUCATION

P. O. BOX 60
RICHMOND, 23216

July 3, 1980

Ms. Edith Roth
U. S. Department of Education
400 Maryland Avenue, S.W.
Washington, D.C. 20202

Dear Ms. Roth:

Mr. John Curtis asked that I write you concerning some of the continuing dialogue between CenTeX and the Department of Education.

It has become apparent that the CenTeX experiment may need to take on an even greater dimension due to limited financial resources and current problems associated with energy. Changes taking place as a result of schools attempting to respond to expanding knowledge, federal regulations, legislative mandates, interest groups, and accountability efforts are overwhelming to both teachers and administrators.

More than ever, there is an urgency to develop vehicles that will deliver information techniques and strategies to meet new needs and, at the same time, provide for revitalization and updating of basic teaching/learning activities. CenTeX has focused its attention on several areas which have been addressing some of these needs. I am referring specifically to its efforts in the delivery of instruction for teachers concerning the expanding emphasis encompassing the handicapped and gifted. These two areas represent our highest priority; however, at the present time, our initial efforts are just scratching the surface. In the future, it may be necessary to examine a number of other critical needs such as the new Standards of Learning, Career Education, Virginia Studies, Health Education, and Employment Counseling and Placement. All of these program areas are extremely difficult to implement successfully without teacher and administrative inservice.

Ms. Edith Roth

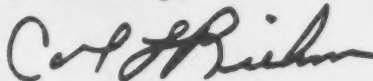
Page 2

July 3, 1980

As I indicated in an earlier account, television must employ a combination of enrichment and directed teaching activities if it is to meet the many needs of today's school systems. The CenTex system brings together resources and offers a two-way approach in at least one geographic area of our state. This effort has certainly been very beneficial to that geographical area and has provided the Department of Education with an opportunity to examine this mode of delivering inservice education.

Through creativity and continued experimental activities, it may be possible to solve many of our problems of communication and specific teacher inservice education through two-way television. The Department of Education is continuing to monitor and explore possibilities with CenTex in terms of its future role as a viable mode of delivering services to local school systems.

Sincerely,



Carl L. Riehm
Assistant Superintendent for
Curriculum and Instruction

CLR:cp

COMMONWEALTH of VIRGINIA

DEPARTMENT OF EDUCATION

**P. O. BOX 60
RICHMOND, 23216**

July 9, 1980

**Ms. Edith Roth
U.S. Department of Education
Washington, D.C.**

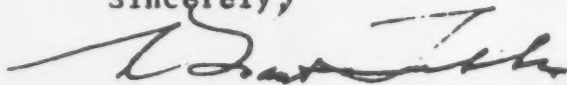
Dear Ms. Roth:

Many of us in the Department of Education have watched with interest the development of CenTeX as an important experimental means of providing in-service education to teachers of exceptional children. The unique technology employed by CenTeX gives promise of further application limited only by our imaginations. Mr. Curtis' aggressive promotion of the capabilities of CenTeX, coupled with his own fertile mind, places no limits on what this kind of operation can do given modest amounts of financial support and sufficient encouragement from governmental agencies and consumers.

It must be apparent that small school systems with limited resources have difficulty providing in-service education, especially to the small numbers represented by teachers of exceptional children. CenTeX effectively and efficiently solves many of the problems which would otherwise be experienced by such school systems.

We watch with keen anticipation for further developments in Mr. Curtis' organization.

Sincerely,



**N. Grant Tubbs
Administrative Director of
Instructional Support Services**

NGT:nmd

cc: Mr. John A. Curtis

WILLIAMSBURG-JAMES CITY COUNTY PUBLIC SCHOOLS
101 MOUNTS BAY ROAD, BLDG. D
(JAMES CITY CO. GOVERNMENT CENTER)
WILLIAMSBURG, VIRGINIA 23185

DR HENRY A. RENZ
Division Superintendent

July 7, 1980

MAIL : P.O. BOX 179
TELEPHONE: (804) 253-2422
(804) 874-2442

Mr. John A. Curtis, President
Center For Excellence, Inc.
P.O. Box 158
Williamsburg, Virginia 23185

Dear Mr. Curtis:

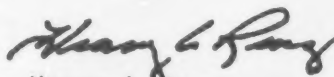
In June of 1974 I enthusiastically endorsed the concept of interactive telecommunication advanced by you. I am equally enthusiastic today as the Center for Excellence continues to expand its services to many areas of the Commonwealth.

The Williamsburg-James City County schools have been able to meet the requirements for inservice of personnel in the area of special education through the programs of CENTEX. Teachers, administrators, and support personnel have been able to conveniently complete course work in their own buildings. The fact that the telecommunication system provides for interaction by the instructor and the student, overcomes one of the most limiting factors of normal televised instruction.

We look forward in the future to greatly expanding our in-house use of CENTEX. Through this system we are able to overcome the scheduling difficulties inherent in the use of traditional televised programming. The completion of our broadcasting facility will enable us to develop programs for the entire school system. We will be limited only by the imagination and ingenuity of the staff.

CENTEX has provided us with a valuable tool. It is now our responsibility to utilize the system to its fullest benefit for the children and staff of the school division.

Sincerely yours,



Henry A. Renz
Division Superintendent

HAR:bmw

Donald S. Bruno
Division Superintendent

Telephone 898-7201
Area Code 804

York County Public Schools

302 Dace Road
Grafton, Virginia 23692



July 1, 1980

Mr. John A. Curtis, President
Center for Excellence, Inc.
P. O. Box 158
Williamsburg, Virginia 23185

Dear John:

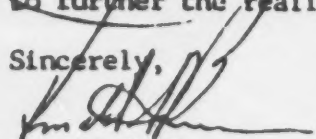
The York County School Division has benefited from the services provided by the Center for Excellence through its two-way telecommunications system. CenTeX has essentially provided a customized service to the school division based on the specific needs of the staff in reaching educational goals.

Staff training and development is an ongoing process designed to improve the quality of the instructional program. Through the CenTeX system we can now deliver such training to three remote locations simultaneously, thus maximizing the availability of courses which meet teacher need and convenience. This is a cost-effective method of delivering high quality educational programming to our staff.

As examples, courses in special education have better prepared classroom teachers to meet the needs of children with special problems. Project GETT-UP, a semester-long seminar in the education of gifted and talented students, brought recognized leaders from throughout the country to provide instruction in this field. Teachers in our school division were thus afforded the unique opportunity of interacting with experts who would otherwise be unavailable.

We anticipate a continued use of your telecommunications system to further the realization of York County's educational objectives.

Sincerely,


Donald S. Bruno
Division Superintendent



Education Nurtures Pride in the Past—Provides Strength for the Future

We Are An Equal Opportunity Employer



Newport News Public Schools

12465 WANNICK BOULEVARD • BOX 6130 • NEWPORT NEWS, VIRGINIA 23601 • 804-599-4411

July 7, 1980

Ms. Edith Roth
U.S. Department of Education
Washington, D.C. 20202

Dear Ms. Roth:

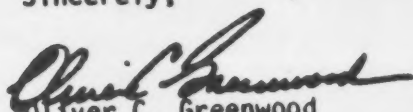
The Newport News Public School Division in June completed its first year of affiliation with CenTeX. A study of the seven teachers who took a college-credit course, the sixty-four teachers who took several non-college credit courses, and the courses themselves reveals the reasons the teachers and administrators of this division see great potential in CenTeX.

The teachers were members of several widely-scattered school staffs. Their participation reminds us that CenTeX is a means of providing in-service training sessions that can begin at least thirty minutes earlier than they would if teachers had to travel to some central location. We cannot help remarking on the gasoline that is also conserved.

The instructors of the courses were highly qualified persons who could not have possibly taught in all of the participating school divisions. CenTeX made them available to all of the divisions.

The convenience of CenTeX, the quality of instructors, the privacy-protection factor, and the picture reception of cable television cause us to look with favor upon CenTeX, its planning, and its program. We expect the participants of the first year will generate enthusiastic interest among numerous other teachers, resulting in an even larger number of participants in 1980-81.

Sincerely,


Oliver C. Greenwood
Superintendent

djb

Poquoson City Public Schools

P O DRAWER 2068
POQUOSON, VIRGINIA 23662

July 2, 1980

Mrs. Edith Roth
U. S. Dept. of Education
c/o Center For Excellence
P. O. Box 158
Williamsburg, VA 23185

Dear Mrs. Roth:

The Poquoson School Division is among the fortunate school divisions in south-eastern Virginia who actively participates in the Centex two-way telecommunication staff development programs.

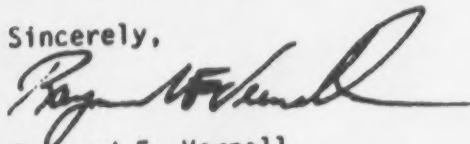
Small in size, our school division does not have the financial or human resources to provide a comprehensive in-service program in the many areas of need. Centex is an asset to our school division. Locally, we have a voice in identifying our staff development needs and in working closely with Centex officials in providing for those needs.

Programs offered via two-way telecommunication certainly provides convenience to teachers, reduces gasoline consumption, and exposes teachers with concerns and ideas in our system to teachers with similar/different concerns and ideas of several other systems.

Should Centex eventually branch out over the State of Virginia, I foresee a tremendously expanded source and frequency of programming resources and benefits available for all school divisions. The programs would appear to be more cost effective; would provide greater selection and perhaps more convenient air times during a sufficient number of teachers' conference/planning periods.

Centex is only beginning to reach its potential. The vision of John Curtis, which is tantamount to clairvoyance, and the skilled precision used in planning and executing programs by high calibre individuals such as Lou Messier, Alan Blatecky, Steve Nobles, and others, are the ingredients for a successful venture.

Sincerely,



Raymond E. Vernall
Division Superintendent

REV: jwm





Hampton City Schools

P.O. BOX 370

Hampton, Virginia 23669

JOSEPH H. LYLES, Ed. D.
ASSISTANT SUPERINTENDENT
PUPIL PERSONNEL SERVICES

July 7, 1980

Ms. Edith Roth
U.S. Department of Education
Washington, D.C. 20202

Dear Ms. Roth:

During the first complete year of operation, 1979-80, a total of 170 Hampton teachers took part in in-service training by means of the Centex 2500 megahertz telecommunication network courses. Offerings included programs for the handicapped and during the second semester of the year, a very popular course in which ninety teachers were enrolled in the in-service for the gifted. Feedback from teachers enrolled has been highly favorable with about 90% indicating good to excellent results and acceptance.

Programming for the 1980-81 school year will be expanded to include programs in the areas of composition writing and social studies. Preliminary indications from teacher response is very favorable for the new courses.

In Hampton, Centex coupled with the use of Warner Cable television system, which services the City of Hampton, has resulted in an innovative and promising device for the Hampton City Schools. The Centex programs are fed to schools over the Warner system and also a special channel donated by Warner and dedicated for city use which allows local programming for in-service use and administrative purposes. Some ideas which have been advised, many of which have been put into effect are:

1. Presentation of local in-service programs
2. Telecast of outstanding speakers
3. Telecast of outstanding classroom programs
4. Administrative announcements
5. Weather bulletins and school closings
6. Information of interest to teachers
7. Rebroadcast of WIRO instructional programs
8. Distribution for the computer network (Special comment is needed concerning use of computer network, see below.)

At the present time, Hampton City Schools owns and operates a medium size computer for instructional and data processing uses. The machine is housed in a central location. Computer science classes are scheduled in the high schools and instructional programs in reading

Mrs. Edith Roth

July 7, 1980

Page 2

and mathematics are available for individual and groups of students in the elementary schools with telephone connections to the central computer. Telephone line charges and toll fees result in a high cost item for instructional programs. Therefore, a study of the use of cable lines was begun in 1979 and a proposal has been submitted for the necessary electronic equipment to provide data lines over cable and thereby, eliminate the need for telephone service for computer terminals in schools.

Very truly yours,

Joseph H. Lyles
Joseph H. Lyles, Ed.D.
Assistant Superintendent
and Pupil Services

JHL/bl

KING WILLIAM - WEST POINT PUBLIC SCHOOLS

OFFICE

P. O. BOX 168

KING WILLIAM, VIRGINIA 23086

George H. Stainback
DIVISION SUPERINTENDENT

July 7, 1980

KING WILLIAM
PHONE 788-3011
843-3422
894-2937

Ms. Edith Roth
C/o Center for Excellence, Inc.
P. O. Box 168
Williamsburg, Virginia 23185

Dear Ms. Roth:

On behalf of the West Point School Board, I would like to commend the United States Department of Education for its interest in the CENTEX system as we feel it is one of the most exciting and useful endeavors being applied to the field of education today. By expanding the delivery system to West Point, our school division has the capability to: 1) receive the inservice training programs made available by CENTEX, and 2) produce programs designed to meet locally determined needs (which can be transmitted to cooperating school divisions). This capability will be a tremendous asset to the region. The Middle Peninsula region is comprised of several small rural school divisions. As such, the ability to offer quality staff development programs essential to the improvement of instruction, is difficult given our limited resources. The telecommunication system will enable teachers, administrators and other instructional and supportive staff from several school divisions to participate in extensive inservice training programs offered on a live, interactive basis in locations and at times convenient to their participation.

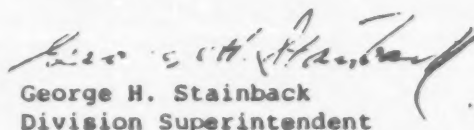
As an important utilization of the CENTEX system, the staff of the West Point school division will apply the telecommunication technology to develop programs and courses designed to address the following local needs:

- a) instruction in foreign language
- b) drug education
- c) enrichment and acceleration for the gifted and talented
- d) fine arts presentations and instruction
- e) instruction in specific areas of need, i.e. composition, self-concept
- f) adult education - A.B.E., G.E.D.
- g) public service and awareness (in cooperation with related agencies)
- h) parent education and training
- i) homebound instruction
- j) demonstration teaching
- k) staff development

Additionally, the availability of the West Point Center for Exceptional Children for use as a demonstration site can be of benefit to other consumers. This project provides special education and related services to physically handicapped, and hard of hearing children. Presently, preschool and school-age students from seven school divisions participate in the program. The availability of such a unique program as a demonstration site, will enable parents, lay citizens and instructional personnel to receive training in the highly specialized area of low incidence handicapping conditions. Furthermore, institutions of higher learning engaged in teacher preparation will be able to utilize training programs developed at the Center as an important teaching device to improve the diagnostic and instructional abilities of teachers working with handicapped students. Also important is our Indian population. Programs concerning their history, culture, etc. can be developed and transmitted from West Point to other interested school divisions.

The benefits accrued through network involvement are numerous and our school division is looking forward to participating in the CENTEX system. If you have any questions, or would like further information, please do not hesitate to contact us. I am sure you will find CENTEX operation and staff as impressive as we have.

Sincerely,


George H. Stainback
Division Superintendent

SDT:GHS:mtm

department of Schools

office of Christian Education

diocese of Richmond

July 15, 1980

Ms. Edith Roth
U. S. Department of Education
Washington, D.C. 20202

Dear Ms. Roth,

I am happy to have the opportunity to write a letter of support for the Center For Excellence, Inc.

I have had the opportunity of working very closely with Mr. John Curtis for a number of years. It has been my privilege to serve as a member of the Board of Directors for CenTex.

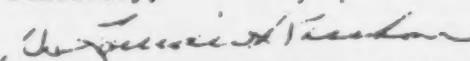
In addition to the many obvious benefits which such a multi-media distribution system contributes to education in the Commonwealth of Virginia, I am particularly interested in the fact that several of the Catholic Schools in the Diocese of Richmond have had the opportunity to participate directly in such a system.

Mr. Curtis from the beginning has been convinced that programming should be made available to all educators in the commonwealth regardless of whether or not they are affiliated with public or private institutions.

The fact that CenTex has been successful in inaugurating and implementing such a system gives me hope that such cooperation in other educational ventures is possible.

If there is additional information which I can supply please feel free to contact me.

Sincerely,



Sister Lourdes Sheehan, R.S.M.
Superintendent of Schools

gj1



OFFICE OF
THE PRINCIPAL

PENINSULA CATHOLIC HIGH SCHOOL
332 - 34th STREET
NEWPORT NEWS, VIRGINIA 23607

June 25, 1980

Sister Lourdes Sheehan, M.S.M.
Superintendent of Schools
819 Cathedral Place
Richmond, VA 23220

Dear Sister Lourdes:

The Centex Programs at PC were conducted as noted in the materials I sent you from time to time during the school year past.

I will get some opinions later from teachers about Centex. Some of the participants were from St. Andrew's School, and some from PC.

My reactions:

- (1) Quality: excellent, outstanding. Most helpful to anyone serious about upgrading his/her professional background.
- (2) Teachers & Presentations: excellent. A few draggy moments, but rare. The teachers and presentors were outstanding. Never a waste of time for anyone.
- (3) Technical: Superior, excellent. No problems.
- (4) Timeliness: The various topics were well chosen, and most appropriate, aimed at current problems.

Problem Areas:

- (1) Some one locally must be the "Coordinator":
 - * Stay after school to lock up; security; heat,
 - * Take attendance, pass out materials, etc.
 - * Act as "Registrar".
- (2) PC offered Centex to St. Andrew's teachers -- how do these persons get credit to the state level? Jeanne Kremer?
- (3) There never seem to be any funds allocated for local operational expenses: postage, coordinator, secretarial service, etc.
- (4) Acting as "Registrar" on the local level is a serious responsibility. I am not sure that a local coordinator, as Centex originally specified, really spelled out this aspect of the duties.

Sincerely Yours,
Brother Barry
Brother Barry Lambour
Principal

Area Code 804 - 345-4216

APPENDIX

The innovative thinking of Project SETT-UP and Project ITTS and the implementation thereof have brought Project SETT-UP, the Virginia State Department of Education-Special Education Division, and CenTeX a continuum of national and local press, TV, and periodical attention.

Excerpts from this continuum follow this page.



Carolyn Click

Gene Blatecky used a combination of American Sign Language and Signed Exact English in her volunteer role as an interpreter for the American Association for the Deaf-Blind.

Picture painted with hand signs

*Your hands speak to me in meanings
Which words cannot express
Whether it be talk of love
Or simple signs of jest.*

*They show a special meaning
In everything you say,
And I've learned to understand you
In this very special way.*

*In a place where there's no hearing
You can put your heart with mine
We can wrap ourselves completely
In a world of loving signs.*

By Carolyn Click

If there is a universe of "loving signs," as the author of those unknown verses indicates, then Gene Blatecky is certainly one of its brightest stars.

Mrs. Blatecky, coordinator of deaf-blind services for the Center for Excellence, has worked for the past three years in a special project that would supply information via sub-carrier broadcasts to the deaf and blind in the Peninsula area.

Out of that service at CenTeX evolved a growing recognition that the deaf suffer a kind of "invisible" handicap. "You don't just pass someone in the grocery store and tell that they're deaf," Mrs. Blatecky said. "They don't carry a white cane."

So Mrs. Blatecky elected to extend her job, which called for putting our news and special communications, that related to deafness over the CenTeX system. She began learning the language of the deaf.

"When I started (at CenTeX) I didn't think it made any difference (to learn sign language)," she said. "The whole program was structured around listener response through surveys." But the deaf, who "listened" to the CenTeX programs through a TTY or teletype machine, often either didn't return the surveys or returned them showing obvious difficulty with language skills.

So Mrs. Blatecky decided to take several classes in sign language at the College of William and Mary, then went on to intermediate classes at Christopher Newport College and Gallaudet College in Washington, D.C., a school devoted to the teaching of the deaf.

Her Christopher Newport professor, Leslie Kidd, agreed to conduct an advanced 15-week seminar this year, and to improve upon those advanced skills, Mrs. Blatecky traveled to Gallaudet again two weeks ago to act as an interpreter at the Sixth National Open Convention for deaf-blind persons.

The convention, held June 20-27, hosted 150 deaf and blind persons from around the country, and required an interpreter for each handicapped person.

As one of those selected as interpreters, Mrs. Blatecky also participated in a two-day pre-seminar which taught such skills as mobility training, transportation assistance, and guidance.

"You had to sign and spell out everything," Mrs. Blatecky said, including each kind of food in the cafeteria line. The handicapped participants were also escorted around Washington, D.C., to such sites as the White House, the Hirshhorn Museum and Sculpture Garden, the Smithsonian Museum, and the National Cathedral, burial place of Helen Keller and Anne Sullivan Macy.

A molded face mask of Miss Keller, the first deaf and blind person to graduate from college, is an integral part of the cathedral displays, so convention participants were able to "feel" the feature of Miss Keller, Mrs. Blatecky said.

Her signing skills, mainly practiced in class and with a few friends in town who also know the language, were also put to the test, but Mrs. Blatecky noted that "I called home after the first day and said it was already worth it."

"It's hard to believe they can understand it," Mrs. Blatecky said, but through a variety of methods, including signing, lip-reading, and just plain

shouting, convention goers "heard" speeches throughout the convention.

Throughout the speeches, two stage interpreters, one signing Exact English, and one using American Sign Language, which is a modified version of signing each word, faced the crowd, so that individual interpreters could also receive assistance if they stumbled.

Mrs. Blatecky, who uses what she refers to as "pidgin signed English," believes that "sign" should be taught in schools just as any other foreign language.

"Signing is a lot of painting pictures," she said. "It's very spatial. Nothing is left hanging in the open."

Sometimes, it is hard to interpret that picture because of the constantly changing language itself. Signs, like spoken words, change with usage, and some are discarded because they are out of date or added because of some new addition in English.

She welcomes the publication of a comprehensive dictionary "American Sign Language," by Martin L.A. Sternberg, because there is at last, the most extensive compilation of signs ever offered.

As for her, the limited number of deaf persons in the area prevents her practicing her language as much as she would like, but through her work with CenTeX and her membership in the Peninsula Club for the Deaf, she is assured at least of keeping her skills intact and providing some occasional assistance as well.

"The best thing is to find friends in the deaf community that you can get together and communicate with," Mrs. Blatecky said.

CenTeX tunes in for United Way funds by 1982

By Rebecca Clark

For the first time in its nine-year existence, the Center for Excellence (CenTeX) is asking local fund-raising organizations for money to help stay in operation. The Special Communications Service (SCS) division of CenTeX is in a particular bind because it is about to use up the last of an HEW grant that began in 1978.

Gene Blatecky, project coordinator of SCS, said CenTeX has applied to the Greater Williamsburg United Way. SCS also may have a chance at federal money funneled through the Virginia Department of Telecommunications, and the organization has applied for help from the United Way of the Virginia Peninsula.

CenTeX isn't included in the 1981 United Way budget just released, because their request is still under review. CenTeX may be considered in next year's budget, however.

The money from the state telecommunications office probably wouldn't be available until next summer. Already, SCS has eliminated three part-time jobs, leaving only Mrs. Blatecky to run the station.

There are approximately 1,500 people recognized as

visually or aurally handicapped who would benefit from SCS programming if the project had enough special radios with the SCS frequency to go around.

Presently, only about 100 print-handicapped people have the special radios tuned to the SCS signal for daily news events.

For the deaf, SCS operates a teletype service that employs a telephone hook-up. About 40 deaf people in the SCS service area communicate over the teletypes and have the machines in their home.

In the beginning, SCS was viewed as an experimental communications laboratory. The 100 or so print-handicapped people currently served were a core group for SCS. Since the program has become so popular, Mrs. Blatecky said, "We're ready to grow." SCS can take on more clients if the equipment is available, she said.

The SCS service area lies within a 35 mile radius of Williamsburg and includes Hampton, Newport News, Gloucester, Poquoson and the Historic Triangle. Localities on the lower Peninsula are now experimenting with relayed signals from Williamsburg to provide communications for handicapped people in those areas.

SCS uses a signal off a subcarrier of WBCI on Ironbound Road, and leases it annually to broadcast programming 70 hours per week during the fall and winter. Summertime broadcasting is to be reduced to weekday daytime programming only.

The station is assured at least of staying on the air until next March, since the signal is paid for until then. The number of volunteer readers for the blind, about 35, is expected to remain stable. SCS will have enough programming for the summer thanks to a free tape exchange provided by the Associated Radio Reading Service.

SCS operates on about \$80,000 annually. Virtually all of it has been HEW money, except for an approximate \$12,000 grant last year from the Virginia Department for the Visually Handicapped.

Roger Thaler, chairman of the United Way admissions committee, said SCS just last week provided updated statistics on its listener demographics, and now the admissions committee has to go over it and make a recommendation to the executive committee of the United Way.

CenTeX provides news-reading services based on stories in local daily papers, including sports, features, editorials and world and national stories. Other types of programs offered on reel-to-reel and cassette tapes compose the bulk of SCS programming.

Your Neighbors

Williamsburg-James City County

Ready, set, hit that light

JAMES CITY — It was reminiscent of the old "College Bowl" time on television — the fastest brains on campus pitted against each other in a battle to the end, to see just who had the best grasp of social studies.

The Battle of the Bobcats ended last week at Berkeley Elementary School, with three teams declared the winners:

Sue Foutz' class topped four other sixth-grade classes; Ed Ribock's class topped five other fifth-grade classes, and Roy Turner's class topped six other fourth-grade classes.

The Battle of the Bobcats, a televised, multi-round social studies quiz similar to "College Bowl," was con-

ceived and put on by Miss Foutz' 32-member sixth-and seventh-grade language arts class.

The youngsters wrote the questions, based on the first three units of the social studies curriculum guide; served as announcers and masters of ceremonies for the 15 "battles," which lasted about 20 minutes each; designed the set and handled the Center for Excellence (CenTeX) television cameras and other equipment which beamed the programs throughout the school.

"It started out as a simple language arts project, but it just took off," says Miss Foutz. "We're going to try it again, and expand it even more, next year."



A confident team consults to come up with a consensus answer.

BATTLE OF THE BOBCATS!

Staff photos
by David Pickel



Ooops. Clovis Braxton and Lynette Eugenis react to a wrong answer, but Lynette's consternation dissolves to joy with the next right answer.



Lynette Eugenis tapes fifth graders.



Samantha Moody hopes somebody's answer is wrong, and it is.

Daily Press

Newport News-Hampton, Va., April 23, 1981

LECTURE TAPED

Sickness Won't Stop Class

By WILLIAM MATTHEWS
Staff Reporter

WILLIAMSBURG — George W. Grayson sat back in bed in his polka-dot pajamas, nudged his glasses higher up on the bridge of his nose and prepared to lecture his class on the first amendment to the Constitution.

"Before I launch into this lecture, let me remind you that we are in a hospital room and there may be nurses, doctors and orderlies coming in and out. But we'll continue filming for as long as we can," Grayson said.

Confined to a hospital bed, "I can't gesticulate the way I usually do," he said.

Grayson pointed out a pole placed next to his bed to hold a plastic container and a long tube that lets antibiotic drip slowly into one of his veins. "We've walked many miles together," he said of the pole.

Grayson, a government professor at the College of William and Mary and delegate to the General Assembly, be-

came ill with a "localized infection" last weekend and was admitted to Williamsburg Community Hospital, where, he said, "They are taking very good care of me."

With the end of the school year approaching and final exams looming, Grayson felt he couldn't take time out from teaching to be sick, so he gave his lectures from his hospital bed, where they were videotaped. The lectures were played at 10 a.m. and again at 11 a.m. Wednesday at the college.

Although he looked a bit pale on the screen of a color television and he sipped periodically from a water glass, Grayson's voice sounded strong and humor crept in and out of his lecture.

As he explained Thomas Jefferson's thoughts on the separation of church and state, Grayson pointed out that Jefferson was "a graduate of William and Mary, and anything a graduate of William and Mary says must be taken very, very seriously."

Grayson cited case after case in

which the Supreme Court struck down required prayers in public schools, but noted that the court has upheld references to God in legislative business and when printed on money.

His students scribbled notes furiously to keep up with the tape.

"I combined two lectures into one," Grayson said later.

"I should be out of the hospital by the end of this week," he said. He plans to give two lectures in the hospital's board room, and then be back in his own classroom by Friday.

The lecture was taped by CenTeX, a non-profit corporation for research and development of educational telecommunications.

John Curtis, director of CenTeX, said the taping cost "a few hundred dollars," and CenTeX absorbed the cost as a donation to Grayson.

"It was relatively simple to tape," Curtis said. "We were expecting some problems with noise," but they never occurred.

Videotape to Get Teacher to Class

Times-Dispatch State Staff
WILLIAMSBURG — While one piece of modern technology keeps Dr. George Grayson confined to his hospital bed today, another will make it possible for him to meet as scheduled with the students in his Government 201 classes at the College of William and Mary.

"I just need to be here with the antibiotics coursing through me," Dr. Grayson said good-naturedly as he lay yesterday in Williamsburg Community Hospital, where he has been hospitalized since Sunday to receive intravenous medication for an illness.

But with the help of The Center for Excellence Inc., a Williamsburg-based educational telecommunications system, the professor will be able to deliver a 50-minute lecture to two classes just the same.

CenTeX officials videotaped the lecture yesterday in Dr. Grayson's hospital room, and it will be replayed today on CenTeX monitors in a lecture hall at the college.

Dr. Grayson, a member of the Virginia House of Delegates

said he hopes to be well enough tomorrow to meet with students in another class at the hospital board room — "if the students will come. That's the real question."

By Friday, he said, he hopes to be back in class as usual.

John A. Curtis, CenTeX founder, said the company was happy to provide its services free "to repay George Grayson for all he's done for us." Curtis, knowledgeable about educational telecommunications facilities around the nation, said it was the first instance he has heard of when a sick professor avoided missing a lecture by videotaping his presentation.

Dr. Grayson explained that he thought of the unusual procedure because it is late in the semester and there is little time left to schedule a makeup class.



Jan. 14
1981

THE
VIRGINIA GAZETTE

Containing the freshest Advice, Foreign and Domestic.

Opinion

Martha R. Gravely Publisher
W. C. O'Donovan Editor

Ambitious CenTeX

Williamsburg recently got national attention with a cover story in the prestigious journal, *American Education*, published by the U.S. Department of Education.

Inside is a lengthy article on the Center For Excellence Inc., based at Berkeley Elementary School on Ironbound Road. In only six years, CenTeX, as it's called for

EDITORIALS

short, has pioneered two-way television communication for the purpose of training teachers who deal with handicapped or gifted children.

Programs originate at Berkeley and are transmitted to schools all over the lower and middle Peninsula. The concept is a smashing success, allowing teachers to get top-of-the-line training through television without having to leave their own schools. It saves time and money, and it works.

From the article: "The three top state officials, five school division superintendents, three curriculum specialists, and other state officials interviewed or contacted in the course of writing this article were all enthusiastic about the accomplishments to date of the CenTeX system. All were excited about the variety of uses for the system and possibility for further development."

In addition to training teachers, CenTeX is providing special news and features to people who are blind and deaf. The deaf and homebound receive news and other services six hours a day, while the blind receive additional entertainment through tapes of books read for them during the evening hours by 50 volunteers.

The innovative and energetic man behind CenTeX is 73-year-old John A. Curtis, who has background in electronics, publishing, motion pictures and computers — perfect for the job.

This stuff is expensive. \$1.7 million from the federal government, \$500,000 from the state, and \$600,000 locally have been contributed to the program. Dr. J. Wade Gilley Jr., secretary of education for the state, said, "I am concerned with extending the network throughout Virginia and making it a permanent fixture."

Success stories like this should be kept in mind during the coming weeks when the new operating budgets are released for local schools and government. "Back to basics" is a slogan that to some extent has backfired on school administrations when citizens demanded a bare-bones school budget. Some room must be left for ambitious projects like those conducted by CenTeX, or we will be left with a generation of students who atrophied on the 3 R's.

• The Center for Excellence (CenTeX), an educational telecommunications research and resource development organization, and Hampton Roads Educational Telecommunications Inc., which operates WHRO-TV and WHRO-FM, have agreed to establish a coordinating council.

The council will recommend cooperative projects to the boards of directors of the two non-profit corporations.

WHRO and CenTeX provide complementary telecommunications services to area school systems, colleges, universities and the general public of southeastern Virginia.

Quiet on the set, roll credits for . . .

News Tracks

The Times-Herald, Thursday, Dec. 11, 1980

By **BILL McLAUGHLIN**

Times-Herald Staff Writer

JAMES CITY — Children in every classroom at Berkeley Elementary School laugh when sixth grader Kathi Gillette tells the "joke of the day" from her seat on the stage of the school auditorium.

Question: "Why did the cow cross the road?"

Answer: "Because the chicken was off duty."

Kathi's audience is able to see and hear her in their classrooms via Center for Excellence (CenTeX) television monitors.

They pickup the Williamsburg area newest morning news show called "Berkeley News Tracks."

It's telecast live and unrehearsed from the auditorium stage at the school.

Soon, the temporary TV studio will be moved into a CenTeX trailer behind the school, when "Berkeley News Tracks" will be beamed to all seven Williamsburg-James City County schools, says Gene Bruss, the teacher who along with Principal Vincent Frilici, conceived the idea for the program.

The Joke of the Day segment is one of the most popular of the 15-minute show, which regularly includes an item of trivia, the day's cafeteria menu, national news, sports, school news, entertainment, weather, exercises, the pledge of allegiance and at least one special feature.

The special features may include guest appearances of children from other classrooms, awards — usually given by Bruss dressed in costume — recipes and book reviews.

The regular announcers are 12 of the 27 students in Bruss' reading class, all of whom are at or above grade level.

Announcers were chosen last month, says Bruss, after a series of TV tapes made others decide "they didn't want to be TV personalities."

"We had a lot of dry runs in the classroom before we went on the stage, learning how to perform on television," says Bruss.

"The children are responsible for the show. They write their own material. I don't edit it or even see it before it goes on the air. There are no rehearsals; it's a straight, live show.

When "Berkeley News Tracks" had its premiere in November, many of the announcers were highly nervous at the start of each program, but now they're "as relaxed as professionals," says

Bruss.

He adds the program doesn't just help his students with their reading, but gives them practice in writing, editing and public speaking.

"We haven't even scratched the surface yet," says the teacher. "Tomorrow, we're going to include a creative commercial for an imaginary product. When we begin telecasting to the entire system, we'll have students come in from other schools to help with special features.

"And soon, with the help of CenTeX personnel, the children will begin operating the TV camera."

At the outset, Bruss and the children are "happy" to leave camera operation to the "real professionals," but they'll soon be learning that behind-the-scenes phase of television.

"Who knows, some of the children might even decide on a career in TV communication," says Bruss.

"Berkeley News Tracks" isn't the first time students have used the CenTeX system, which in the past has primarily been used for in-service teacher training.

A presidential debate, featuring student surrogates for Jimmy Carter, Ronald Reagan and John Anderson, was held shortly before the Nov. 4 election.

Bruss plans to inaugurate a televised spelling bee in the spring to "find the Berkeley champion" who will enter the national spelling bee sponsored by The Times-Herald.

Sue Foutz, another Berkeley teacher who has been instrumental in using the CenTeX system, plans to begin a televised game show, similar to "College Bowl," in the near future.

"We're just getting started," says Bruss.

On "Berkeley News Tracks," the announcers vary their subjects from day to day.

For example, in the same show Kathi Gillette told the Joke of the Day, the lineup was:

Scott Rutter, trivia; Ricky Smith, menus; Greg Pendleton, weather; Jared Moore, sports; Aaron Small, national news; Jim Sheridan, school news; Amanda Sandos, entertainment; Ramona Bartlett, exercises, and Lara Hoyle, Pledge of Allegiance.

The day's special event included a two reports: one by April Siemon on Student Council Association activities and another on "Santa's Shop" by Susan Lingerfelt, dressed as an elf.



Staff photo by JOE FUDGE

Berkeley Elementary School students prepare a "Berkeley News Tracks" 292
show live and unrehearsed from the auditorium stage.

'Anderson' wins debate

John Anderson was the hands-down winner of the mock Presidential debates held at Berkeley Elementary School last Friday, Oct. 24.

Seven students in the Berkeley and Bruton Heights gifted and talented program, PRISM, assumed the roles of the three major party candidates — Reagan, Carter and Anderson.

Students at the two schools have been following the election process very closely

and Merry Feyock, PTA Council president served as judges for the event. They watched and listened to each candidate closely, judging them on poise, delivery, and accuracy of information.

Bonnie Rifkin, PRISM

resource teacher for grades 4-6, served as the panel moderator. The event was made possible by the Centex staff who designed an elaborate set for the debate and telecast the debate for other interested schools.

SCHOOL NEWS

by reading newspapers, magazines and pamphlets, and watching the news every evening.

Children from both schools submitted questions to be asked of the candidates during the debate. Although the student candidates were well versed on their respective candidate's views, they still had to respond to the questions "cold," as in a regular debate.

Henry Renz, school division superintendent, Gail Hood, school board member; Wayne Block, WBCI news director;



Daniel Fuchs portrayed John Anderson in the mock Presidential debates at Berkeley Elementary School last Friday.

Daily Press

Newport News-Hampton, Va., October 25, 1980

Anderson Wins School Debate

WILLIAMSBURG — John B. Anderson won a televised mock presidential election debate held by the Williamsburg-James City County school division here Friday.

Portraying Anderson in the debate, which was transmitted to the division's schools via CENTEX, was Bruton Heights' Elementary School sixth grader Daniel Fuchs.

Ironically, one of the judges, from the League of Women Voters, had to cancel her appearance.

Tuesday, the League will host a real presidential debate featuring Ronald Reagan and Jimmy Carter — but not Anderson.

Students will hold a mock election on the candidates later.

Faith lights his world

By Jack V. Priest

After he earns his degree in urban studies at Virginia Union University, Ernest E. James Jr. may enter a graduate studies program. Still skirmishing with indecision, he at the same time admits that he's tempted to go directly from college to employment with a government agency assisting low-income families.

Ernest James, better known to his friends simply as Skip, has been very big on helping people for a long time now. He's the recipient of two letters of commendation from the Greater Williamsburg Association for Retarded Citizens for his efforts in coordinating and directing ARC's telephone advocacy programs.

Nine years of total blindness have perhaps given Skip a firmer grasp of the concepts of giving help and receiving help than could be expected from a sighted person. Skip had nothing but praise for CenTex (Center for Excellence), saying, "It did an excellent job for me. It has really been of great help."

He spent several months there, first at its location on the campus of the College of William and Mary and later at CenTex's present address, 1118 Ironbound Rd. He seemed concerned that so many citizens of Williamsburg know little or nothing of its existence or purpose. In the words of founder and president John A. Curtis, "CenTex is a non-profit, Virginia chartered, IRS-approved corporation which seeks to determine the educational, medical and social service needs of the area."

In other words, CenTex helps people like Skip James. VUU, where he's now in his junior year, has offered him a big hand up, also.

But the biggest morale factor in Skip's life is the Richmond college's basketball team. The Pan'bers, he will tell you as he swells with pride, are Division 2 National Champions in basketball. From the time he was a tiny tot, he said, it was his favorite sport. He played it well as a youngster, played it until cataracts attacked his vision at 13, but even after a series of operations that left him blind he "still throws a few at the basket every now and then."

Skip was born and reared in Williamsburg and still makes his home at 101 Douglas Dr. whenever classes in Richmond are not in session. He entered first grade at the old Frederick Douglass Elementary School, later called Magruder Annex, until the onslaught of cataracts. He was then enrolled at the Virginia School for the Blind and Deaf on Shell Road in Hampton.

Although there was nothing particularly remarkable about his early education, the next phase of it was unusual if not unique. He left the Hampton school four years ago when he was 18 and transferred to York High School just like any normal, sighted teenager.

How difficult did he find it to function in a regular public high school with no special facilities for dealing with a blind student? "I'll admit it was a challenge, but I made out okay," Skip said. He made out okay enough to keep up his grades and was at the same time on the wrestling team, taking on sighted opponents in the 130-lb. class.

He transferred the following year to the newly opened Bruton High School, earned his diploma and was on his way to four years of college at VUU in Richmond. Classmates have frequently remarked that it's not often they meet a sightless student who avails himself of



Jack Priest

Skip James believes in three things: faith for today, hope for tomorrow and the invincibility of his beloved Panthers of Virginia Union University.

neither a Seeing Eye dog nor a cane. As for a guide dog, he said that he'd toyed with the idea for several months.

"The more I think about it, the better I like it," he said after giving the matter a moment's thought. "But as for a cane, no thanks. I did use one for a time. But no longer. I came into this world with two legs, and I don't need three."

Skip James is a profile in courage, a young man looking forward to another summer of work at Busch Gardens and

looking forward to a long and gratifying future after that in his chosen line of work. And that's the term that he himself uses when discussing the future, "looking forward."

He sat stiffly erect in a chair in the offices of the Gazette as a photographer hovered around to take pictures. "I wake up smiling every day, knowing I'm going to make it a good day." His smile broadened. "Faith for today and hope for tomorrow," he added. "I don't ask for anything more."

SCHOOL

Two-Way TV Brings Experts to School

by Virginia Gabriele

WILLIAMSBURG — Three hundred teachers, administrators and parents across the Peninsula have just finished a unique series of seminars that brought 15 nationally recognized experts in the field of gifted and talented education into the local schools via two-way television.

Drawing on their extensive experience, the experts told the teachers how to identify gifted students, how to design programs and curriculum for the gifted, how to develop effective teaching strategies and how to evaluate the results.

All of this was done live from studios at the Center for Excellence Inc. (CenTeX) in Williamsburg. The teachers,



Dr. Sidney Parnes, professor and director of creative studies at the State University of New York at Buffalo (right), establishes rapport with (l to r) Celeste Koeleveld and Estelle Koeleveld, Denbigh High; Bard Bloom, Lafayette High; Jordana Zubkoff, Bruton High; Robert Kudlinski, York High.



Technicians ready set for filming of lecture geared at instructors of gifted children. The tapes will be made into a statewide library system for continuing assistance to the disciplines of instructing the gifted.

gathered in about 25 schools across the Peninsula, were able to ask questions via a telephone conference network. One group of teachers also had a direct two-way TV link with the studio.

Called Project GETT-UP (Gifted Education via Telecommunications: Teacher Upgrade), the seminars were developed jointly by CenTeX and York Public Schools

under the direction of Joan Byrne, York County coordinator for gifted/talented programs, and Dr. Denise DeWald of CenTeX.

The project was funded by a grant of \$54,266 from the U.S. Office of Education under the aegis of the Virginia State Department of Education.

It was offered to public school personnel in York County, Newport News,

Hampton, Poquoson and Williamsburg-James City County, as well as at the private schools of Walsingham Academy, Jamestown

Academy and Peninsula Catholic High School.

Videocassettes of the 2½-hour broadcasts are being edited for distribution throughout the state. The edited videocassettes, accompanied by some written materials, have already been field-tested on 150 persons in Norfolk and Virginia Beach schools and have had a "very successful reception," according to Mrs. Byrne.

"The real value of the program is having those tapes available," said Byrne. "We can take it topic by topic and

work with groups of teachers. It's not just a one-shot thing."

CenTeX has applied for additional funding from the U.S. Office of Education for national distribution of videocassettes and also to expand the course into a year, going into more depth in each area of gifted and talented education.

About 70 of the participants took the course for graduate college credit from the College of William and Mary, while most of the others used it for certificate renewal. One Tabb High School student who wants to enter the field of gifted and talented education also participated in the seminars.

"You can't measure the impact yet in terms of change in what the teachers are doing," said Byrne. "But people have gained ideas."

Several of the experts also attended dinner or lecture meetings or taped programs with gifted students, and one held a workshop with parents at Tabb High School.

This is CenTeX's first instructional project outside the field of special education. Since its formation in 1973, CenTeX has received more than \$2.5 million in grants to develop its two-way telecommunications system and related programming. Further information: 229-8541.

Transmitter Tower To Be Built In Spring

By MARK MIDDLEBROOK

Staff Reporter

WEST POINT — The construction of a television transmitter tower serving West Point and other schools is scheduled to begin in the spring, school officials announced Friday.

The tower, to be built and operated by the Center for Excellence, a Williamsburg-based, non-profit educational research and resource development corporation, will be built on West Point School grounds at a cost of \$150,000 to \$200,000.

The 249-to 299-foot transmitter tower will link West Point with three other transmitters in Norfolk, Williamsburg and Newport News creating the backbone of a two-way telecommunications network that will

eventually stretch throughout the Tidewater area.

"We are the first small, rural school division to have such a transmitter," School Superintendent Stephen M. Baker said. "It's an honor that they would ask us."

The network will have the capabilities of two-way audio and visual communication allowing a teacher to instruct classes in several different communities.

CenTex has received more than \$2.4 million in grants the past six years to pay for the system. The Williamsburg and Newport News stations are already operating.

The West Point transmitter should be operating by fall.

Unique Seminar Plays James City

By FRAN KRZYWICKI
Staff reporter

WILLIAMSBURG — A unique seminar to train Peninsula educators in teaching gifted and talented children premiered Wednesday at Berkeley Elementary School in James City County.

From the stage of the school's auditorium, gifted and talented education advocate Harold C. Lyon spoke to teachers seated on bleachers around him.

In front of Lyon a camera crew followed his every movement with closed circuit TV equipment.

Simultaneously, in 90 other Peninsula schools Wednesday afternoon, about 240 teachers collectively watched Lyon on their closed-circuit TV screens.

After Lyon's talk, teachers at each school hooked into a telephone network, allowing participants to ask Lyon questions or present their own viewpoint on gifted and talented education.

The unusual electronic media "classroom" for teachers is operated by the Center for Excellence Inc. (CenTeX) in Williamsburg.

The seminar series on gifted and talented education is being beamed to 91 Peninsula schools, including the five school divisions and three private schools.

"It's, without a doubt, the only multi-media system of its kind in the United States," CenTeX President John A. Curtis said at a lunch Wednesday at the College of William and Mary, to inaugurate the new "telecommunications" seminar on gifted and talented

education.

Developed by the York County gifted and talented program coordinator, the concept is to train educators in their own schools, through the use of the TV screens and telephone network.

The program was funded with a \$54,000 grant from the U.S. Office of Education.

CenTeX, a non-profit corporation, is no newcomer to the Williamsburg area. In 1974 a pilot program the center started with the Williamsburg-James City County school division that provided teacher training in special education.

At that time, the Williamsburg-James City County CenTeX project received national recognition as one of the first of its kind in the country.

CenTeX officials say that since then they have received more than \$2.5 million in grants to develop its two-way communications system.

Lyon, who is head of the Office of Gifted and Talented, a branch of the U.S. Office of Education in Washington, gave the first lecture in the seminar series Wednesday.

State Superintendent S. John Davis, who also attended the kick-off luncheon, said that "unless we intercede for the gifted and talented, those students will end up on the other end of the educational spectrum, (that is) the emotionally disturbed."

Other sessions of the seminar series, which will conclude April 30, will tackle topics like identification of the gifted, teaching strategies and curriculum.

Metro wrapup

GETT-UP will aid gifted students

WILLIAMSBURG — Teachers and administrators in the Peninsula's five public school systems are now able to participate in a series of television seminars dealing with education for gifted and talented students.

The course, which began Wednesday, is being offered as part of Project GETT-UP (Gifted Education via Telecommunications: Teacher Upgrade). It is being delivered to schools throughout the Peninsula by way of the two-way television system of the Center for Excellence in Williamsburg.

The course features 15 nationally recognized experts in education for gifted and talented students. They'll conduct weekly seminars from 3:15 to 5:45 p.m. on Wednesdays via the TV system from its studio site in Berkeley Elementary School, James City County.

The Times-Herald, Newport News, Va., Thursday, January 17, 1980

TV Series for Teachers Is Launched

By Wilford Kale

Times-Dispatch Staff

WILLIAMSBURG — An unusual series of television seminars on education for gifted and talented students was launched yesterday for teachers and administrators in five Peninsula school divisions.

The 15-week course is the first instructional project outside of the special education field undertaken by CenteX (Center for Excellence Inc.), a Williamsburg-based non-profit organization that has received more than \$2.4 million in the past six years to develop a two-way telecommunications system.

Working with the York County, Williamsburg and James City County, Newport News, Poquoson and Hampton school divisions, CenteX has created an audiovisual network to be used by students, teachers and administrators.

Network Operating

The network is in full operation in Williamsburg and Newport News and, according to a CenteX spokesman, stations are expected to be established in Richmond, West Point and Norfolk.

The concept provides for instructors to teach from a television studio at the center's facility at Berkeley School in James City County. The

program is broadcast to public and private schools in the area, much like educational television.

How the system is being enlarged, and yesterday, 91 schools in the five school divisions received the initial gifted student seminar.

Telephone conference lines enable the instructor and teachers to hear questions asked at any location and to participate in discussions. Using mobile TV units, schools can have the two-way video service.

Project GETT-UP

The gifted and talented student course is part of project GETT-UP (gifted education via telecommunications: teacher-upgrade), and will feature 15 experts in gifted and talented education who will conduct seminars on Wednesday afternoons via the TV system.

Dr. Harold C. Lyon, director of the Office of Gifted and Talented in the U.S. Office of Education, presented the first session yesterday to nearly 250 teachers and administrators. Future sessions will deal with such topics as identification of the gifted, teaching strategies and curriculum planning.

The course is designed to

allow participants to be eligible for graduate college credit through the College of William and Mary or for non-college toward teacher certificate renewal.

Project GETT-UP has been developed by the York County public schools and CenteX. Joan Byrne, York County coordinator for gifted/talented programs, developed the concept and is serving as the project's co-director. It is financed by a \$54,266 grant from the U.S. Office of Education, under the auspices of the Virginia Department of Education and in cooperation with the Southeast Virginia Council for Gifted and Talented Education.

Video Cassettes

The telecasts will be edited and placed on video cassettes for distribution throughout Virginia by CenteX under the direction of the state Department of Education.

Until the development of this TV seminar system, the presentation of training "of this caliber has been limited to workshops presented at one location," Mrs. Byrne said. "Enrollment in such workshops is limited and the time and cost of participant travel are astronomical."

The CenteX system offers the

opportunity for teachers and administrators in virtually unlimited numbers to participate right in their own schools, and the conference telephone network allows any participant to interact with the instructor and with participants at other classroom sites.

CenteX President John Curtis cited the success of previous and current CenteX projects dealing with special education and gifted/talented education at a luncheon meeting of program supporters.

Future Predicted

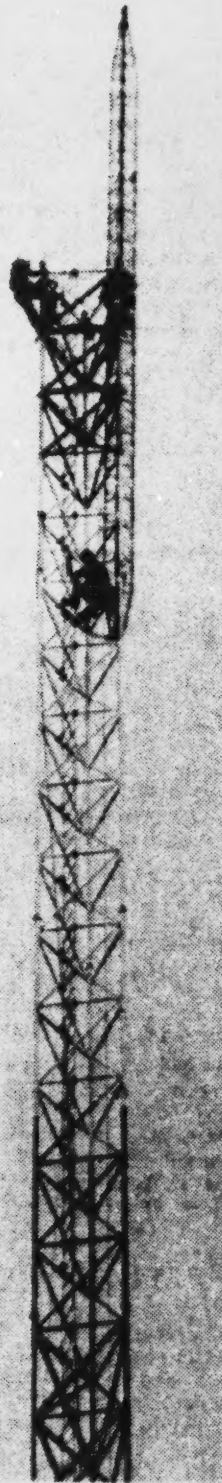
"Gifted and talented students are the youngsters who are going to solve our energy crisis ... and crises of the future," Dr. Lyon said. "This is the kind of program that will work and that we need."

He said education today must "fight against the lack of awareness that gifted and talented children can make it on their own. We must provide opportunities for these children to think for themselves while in the schools and to help themselves."

Dr. Jack Davis, state superintendent for public instruction, praised the CenteX effort, saying, "Unless we intercede for the gifted and

talented children, we could find those same students" at the other end of the spectrum as emotionally disturbed children. "They must be challenged and given opportunities to achieve," he added.

This course, he said should help teachers better understand the needs and requirements of gifted and talented students.



Sky high

Two unidentified workmen do not seem to mind the altitude as they work toward completing the Context television transmitter tower located behind West Point Elementary School. The television system, operated by the Center for Excellence in Williamsburg, is scheduled to be operational shortly. [Photo by Alan Chamberlain]

Two-way TV tower in West Point to extend network

By JEFF BYRD
Tidewater Review Staff

What is now a vacant patch of grass behind West Point Elementary School will soon balance a 249-to 299-foot-tall transmitter tower which will extend two-way television from Norfolk to upper King William County.

West Point School Board Chairman Edwin Merrell signed a contract Dec. 14th to allow the construction of the fourth "backbone station" in a network of two-way audio and visual educational television.

The system's founders hope to broadcast, from studios at each backbone station, on the 28-megahertz channels provided by the Federal Communications Commission (FCC) for Instructional Television Fixed Services.

They hope to strategically place "rib station" towers, which will broadcast over 20-mile radiuses each, to cover all of Tidewater Virginia, from Norfolk to Tappahannock, and from Dinwiddie to Accomac, on the Eastern Shore.

Merrell, Superintendent Stephen Baker, and Sharon Turshen, special education director, held a press conference last Friday to announce the new educational service, which will go "on air" next fall.

Two-way television is coming to the watery part of Virginia through the auspices of a non-profit corporation, CenTex, and government grants provided to upgrade special education.

According to press releases of CenTex, the system is one of the first in the nation to begin exploring the educational potential of television.

Congress began giving grants for educational television broadcasting facilities in 1962.

But, according to CenTex founder and Chief Operations Officer John A. Curtis, most funding has gone towards public television, which seeks to provide programs of general cultural and informational interest.

This was not the intent of Congress, Curtis argues in an article published in "Educational and Industrial Television."

Curtis founded CenTex to meet what he sees as the real intent of the legislators by providing specific educational programs for local school systems, he explained.

The local two-way system has the advantage of offering low-power, inexpensive TV in which people in an area can visually and verbally communicate back and forth without traveling at all. Classes which once could not be offered, due to a lack of students at any one location, can now be offered by bringing numbers of students from many locations together by TV.

The system offers 14 channels for use simultaneously, and each is private. Receivers must be installed to tap into the educational airwaves broadcast by CenTex.

A study, conducted by Curtis's organization, showed that special education, mandated to localities in 1972, is the area in which the most educational needs exist.

The construction of towers in Norfolk, Newport News, and Williamsburg has

been funded at a cost of over \$2.4 million, under state and federal grants, to give in-service training to professional and para-professional special education personnel.

The classes will be broadcast from studios operating in Phi Beta Kappa Hall, on the campus of William and Mary.

During 1978, over 150 teachers and administrators, located in 10 different schools throughout James City and Williamsburg, took TV classes in the hours just before and after school.

Teachers taking a class were able to stay in their own classroom, yet communicate with their instructor, and others taking the course in other locations, as quickly as if they were all in the same room.

Besides in-service training for teachers, the television network founders hope to provide guidance to parents of handicapped children,

diagnostic and prescriptive services, and direct services to the children, including entertainment, especially for the homebound.

Education is just the beginning of what Curtis and others hope the two-way television system will be used for. They see it as an experiment in which to test telecommunications for use in rehabilitation, medical services, and social services.

The CenTex system could bring cable television to West Point and area residents, someday, School Board Chairman Merrell pointed out.

With studios to also be housed on West Point school grounds, the town could get into community programming, Merrell added. "The tower could possibly be used for an FM tower, or to pick-up cable television, or for us to put our own special education antenna upon," he explained.

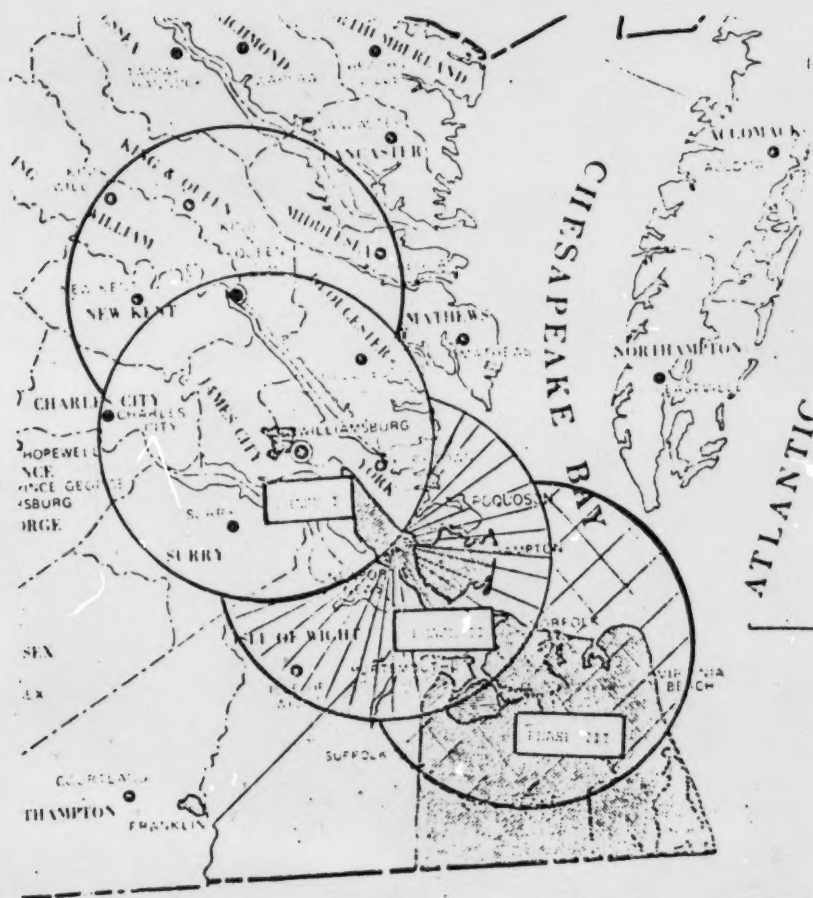
A 20-year contract with CenTex, however, provides that the Williamsburg-based non-profit firm must approve any other than educational plans.

Baker said he will apply for a grant to expand the current construction project at West Point Elementary by 1,500 square feet. This would allow the entire West Point Center for Exceptional Children to be moved into new quarters, leaving the mobile units now housing the center for a studio.

Another grant application will be filed with the state Department of Special Education for studio equipment.

"We see this as a boom for the region and West Point," Baker said. "It is an honor that they would ask us."

The superintendent said construction should begin this spring and cost between \$150,000 to \$200,000. No local funds will be expended except for electrical current to run the tower and studio.



King William Plans To Join TV Program

By MARK MIDDLEBROOK
Staff Reporter

KING WILLIAM — The King William school division is going into the television business.

The King William County School Board recently approved a contract with the Center for Excellence, a Williamsburg based non-profit educational research corporation, to establish a 300-to 350-foot television transmitter at King William High School.

King William will be the fifth "backbone station" in the educational network, School Superintendent Dr. Stephen M. Baker said.

The West Point school division has also joined the network and is planning to build a 249-to 299-foot tower at the West Point High School.

CenTex has transmitters in Newport News, Norfolk and Williamsburg.

John Curtis, executive director of CenTex, said the goal of the center is to establish an educational communications network from Norfolk to Richmond.

Baker said King William was not originally part of CenTex's master plan for establishing the system, but the 50-acre campus at King William High School sits on a ridge and provides a good location for beam-ing television into Richmond.

The high school's designation as a backbone station means that it will have the ability to transmit programs as well as receive them.

Baker said studio space will be provided in the high school and will be paid for by state and federal grants.

The schools will be able to transmit three hours of local programs a day and Baker said King William will broadcast special education programs for teachers.

Construction on the tower is expected to be completed in July. CenTex has a Department of Commerce grant to build the tower, which will cost \$150,000 to \$200,000.

Special education aided by TV

By JEFFREY LAIGN
Times-Herald Staff Writer

Hampton teachers are learning techniques for instructing students with special educational needs by means of closed-circuit television.

According to Dr. Joseph Lyles, assistant superintendent, all 36 city schools and one administrative building now receive instructional programs from Center for Excellence Inc. (CenTeX), a nonprofit telecommunications organization in Williamsburg.

"This is going to be quite a hook-up before it's over with," says Lyles of the project funded by a \$74,000 state grant.

"This (grant) money provides for TV sets and costs of all the electronic amplifiers and scramblers to connect up with Warner Cable."

Lyles says total cost to Hampton includes \$180 for cable installation and about \$500 per year for electricity.

Since a receiving antenna has not been erected yet in Hampton, Lyles says, programs are beamed from Wil-

liamsburg to a Newport News antenna and rechanneled to Hampton via Warner Cable.

Although 18 programs have been developed, six are now available for use by teachers. Topics include techniques for teaching handicapped and emotionally disturbed children, and for dealing with parents and other teachers.

Many of the programs are broadcast after the school day ends so teachers can watch them before they go home. They are not required to watch the shows, however.

Lyles says Poquoson, Williamsburg and York County school systems also have plugged into the CenTeX system.

CenTeX officials say Norfolk will begin receiving the programs in June. Virginia Beach, Chesapeake and Portsmouth schools will participate within the year.

After Hampton's tower is built this spring behind Mary Peake Annex, Lyles says CenTeX will transmit educational programs to the Eastern Shore.

Although state funding for the

\$25,000 tower has not been guaranteed, he says "CenTeX is trying to negotiate that," and confirmation seems likely.

The tower will make two-way video transmission possible, enabling a teacher viewing the program to be seen by and to communicate directly with instructors in Williamsburg.

Now, teachers who watch have a phone, and if they have a question, they call the Williamsburg station number.

Lyles says the system also will provide a direct communications link between the school system's central administration and individual schools. During emergencies, all Hampton schools simultaneously could be contacted simultaneously.

When the contract with CenTeX was presented to Hampton School Board in July, some members were wary. Consequently, officials contacted a school system that had been using a similar media service for several years.

According to the Birmingham, Ala. system, the service had proven invaluable in disseminating information

between administrative offices and schools and in providing instructional information for teachers and students.

First proposed in 1973, CenTeX is the only such facility in the state, the brainchild of retired inventor and engineer John A. Curtis.

Curtis, 70, obtained federal funding for the project in 1976 after three years of lobbying. He said then he believed CenTeX represented the world's first intensive use of telecommunications to provide special education services.

"I've been interested in television and computers all my life," he says, "and my first wife was interested in PTA work and Board of Education work."

Although CenTeX is staffed by 20 full-time paid employees, 60 volunteers and "many part-time employees including instructors, none of us (directors) including myself has ever taken a dime out of it," he says.

"You'll find it's going to be as useful to the Hampton school system as it has been elsewhere," Curtis says.

Centex Grant

WILLIAMSBURG — A \$171,000 grant from the Department of Health, Education and Welfare will finance the first half of a project planned by the Center for Excellence Inc. to determine needs and develop a curriculum for special education training.

The grant was announced Wednesday by 1st District Rep. Paul Tribble.

A spokesman for Centex said the center will conduct a national study to determine the special education curriculum needs of schools of education which are interested in pre-service special education training.

A curriculum will be developed based on the needs determined by the study.

The 20 month program will develop the curriculum to make maximum use of telecommunications including everything from satellites to the regional distribution system operated by Centex in Tidewater.

Centex receives \$300,000 grant

A \$300,000 grant from the U.S. Department of Commerce has been awarded to The Center for Excellence at the College of William and Mary to expand their two-way telecommunications system.

The grant, to be matched by \$100,000 from Centex, was announced last week by 1st District Rep. Paul S. Tribble Jr.

According to John A. Curtis, founder of Centex, the grant will be used for the development of the "backbone" of the multi-channel, multi-service public telecommunications network. That network now provides in-service teacher training,

medical and social services.

The new grant will extend the network to the Richmond area and cover the counties and cities between Williamsburg and Richmond.

Curtis said Centex has also applied for additional grant money to open up channels along the north-south corridor of Virginia. These "ribs" would include such areas as Petersburg, Hopewell, Dinwiddie County, Sussex County, Surry County, Emporia, Greenville, Mathews, Northampton County and parts of the Eastern Shore.

THE VIRGINIA GAZETTE.

CenTeX stands for communications excellence at school

By Jack V. Priest
Columnist

Without knowing it at the time, every physically handicapped and sensory-impaired person in the Williamsburg area was abundantly blessed on the day that John A. Curtis moved here in 1972. It was less than a year later that Curtis established The Center for Excellence Inc. in a small, inconspicuous office in Phi Beta Kappa Hall.

The Center for Excellence, a name perhaps unfamiliar to many area residents, is more commonly known as CenTeX. CenTeX is a Virginia-chartered, IRS-

HIGH PRIEST

approved, non-profit, educational research and resource development corporation. And if you think that's a mouthful, have a look at only a partial list of CenTeX's objectives.

Among them are: To identify and define the major unfulfilled educational needs of the geographic areas which it seeks to serve; to develop the educational curricula, teaching capabilities and resources to meet these unfulfilled needs; and to make intensive use of modern electronic technologies, such as telecommunications, to increase the teaching effectiveness and the distribution scope of educational services.

Considering how far CenTeX has come since its humble inception, it was astonishing to learn that John Curtis entered upon his ambitious undertaking alone. It was not until 1976 that he had even one single paid assistant.

Today, in addition to 55 to 60 volunteers, there are 10 full-time paid employees, but that number does not include Curtis. The founder and president of CenTeX derives no income directly or indirectly from his corporation, and he has at no time received a penny from it.

Why not? Is it unreasonable, regardless of how dedicated one is to a labor of pure love, to expect a little remuneration every now and then?

The man who spent most of his adult life in the communications industry, and later in the computer business before his retirement, answered with unassuming, characteristic modesty. "All retirees should put back into society some of the things which society has given them."

A kind of gentle but paternalistic authority comes across when Curtis is talking, leaving his auditors in no doubt that here is a man who knows whereof he speaks. His speech is what TV announcers and voice and diction coaches call standard American, free of any sectional accent and assuredly devoid of the overtones of Brooklyn, where he was born in 1909.

After a childhood divided between Hicksville, Long Island, and in the Catskill mountains, Curtis graduated from the Lawrenceville School, long considered by American educators as a paragon of prep schools. He rounded out his formal education



CenTeX director John A. Curtis

by earning a B.A. degree from Yale University in 1930.

In his long quest for educational excellence, Curtis found his brainchild experiencing growing pains in its cramped quarters at Phi Beta. CenTeX in its six years there had expanded in scope, personnel, equipment and function. In September 1979, it made its first and only move, to its present location behind Berkeley Elementary School on Ironbound Road. There, in the four temporary buildings formerly occupied by the Williamsburg-James City County Division of Pupil Personnel Services, CenTeX carries on almost all of its highly sophisticated educational and communications services.

Space limitations of the four buildings, which are actually double-width trailers, necessitated setting up the CenTeX television station on the stage of the Berkeley auditorium. Acting as tour guide, TV production manager Scott Wheeler explained as he walked from the apron of the stage to the control room backstage, "From here all programming is telecast to receiving sites in individual schools in Williamsburg, James City County, York County, Newport News, Hampton, West Point and Poquoson."

The courses are telecast live to the systems, where the teachers can interact with the instructor and with each other via a conference telephone system. In addition, a mobile television van sends a TV picture of a class at one of the receiving sites to the instructor in the studio for "face-to-face" contact.

These telecasts are aimed at students who are in turn public school teachers, many of whom work with handicapped children. "A great many of these teachers are studying for recertification," said CenTeX business manager Cliff Pence, "while others are taking courses for graduate credit."

Despite its striving for excellence, if not perfection, CenTeX is by no means elitist. It is, on the contrary, an almost unique example of education and democracy working hand in hand and complementing each other. As John Curtis put it, "We are interested in making the maximum use of modern telecommunications methodology and improving learning quality of all levels of education, including those required for the gifted and talented and high level professional, as well as that required for the factory worker and the sensory deprived population."

When John A. Curtis speaks, through the multiple voices of CenTeX, a whole lot of people listen.

Credit to Curtis

I was pleased to see the recent Gazette editorial outlining the significant contributions that Pete Renz has made to the community during his years as superintendent of the Williamsburg-James City County schools.

I would like to bring to the attention of the Gazette and its readers the fact that John A. Curtis of Walnut Hills Drive was solely responsible for the concept which eventually resulted in the establishment of CenTeX in 1974. Numerous community leaders endorsed the idea, but it was Mr. Curtis's technical knowledge of television's various capabilities, his conviction that that medium must be put to use in supplementing traditional educational programs, and his persistence in the face of what appeared to be insurmountable odds that accounts for the existence of CenTeX now as a provider of a variety of educational services.

Stella Neiman
310 Burns Lane

For more on CenTeX, see High Priest below. —Ed.

October 1, 1980

Centex Grant

WILLIAMSBURG — A \$300,000 federal grant to The Center for Excellence Inc. (Centex) will allow the television system to expand into the Richmond area.

The grant from the Department of Commerce was announced Tuesday By 1st District Rep. Paul Tribble. The federal money must be matched with \$100,000 by Centex.

A spokesman said the grant will provide for two new stations for transmissions so that the in-service training for teachers can draw on the expertise between Norfolk and Richmond including such schools as Virginia Commonwealth University and Old Dominion University.

The new service should be installed by next fall.

Approved System To Aid In Faculty Training

By KAREN COX
Staff Reporter

Hampton school officials are looking for the most economical answer to a requirement they provide in-service training for faculty members.

School superintendent William Anderson believes CenTex may be the only solution.

CenTex, the Center for Excellence Inc., is a non-profit corporation using telecommunications for educational research and development.

The Williamsburg-based firm is largely financed by federal and state grants which allows school divisions to obtain its services at a relatively low cost.

CenTex has already developed 18 programs to help prepare teachers for work with handicapped students. Additional programs are being planned to meet other teacher needs.

The agreement approved by the Hampton School Board Wednesday night paves the way for CenTex's application to receive federal grants to pay for instruction of a tower and necessary telecommunications equipment. Hampton will have access to all CenTex teacher training programs and certain equipment needed to transmit and receive the programs.

The only cost to Hampton will be about \$180 in labor costs for installation of the cable connecting the tower to the studio. The system also will be responsible for routine utility and maintenance costs. Electricity expenses are expected to be about \$500 a year.

Before the board would approve the agreement, it asked school officials to contact a school system which had been using a similar service for a number of years. A report from an instructional television coordinator in Birmingham, Ala., showed they operate four channels for telecast into schools. Their

programs consist of instruction for students, in-service for teachers, public affairs programs and programs designed to aid in school administration.

The Alabama system also reported the service had become indispensable in getting information from the central school office to teachers and principals. Furthermore they can reply to requests from individual teachers and principals, make announcements, give weather reports and discuss successful instructional programs or special problems.

School board members also heard a report on how the system is handling assistant principal assignments, which board member Joseph Dismond said could invite discrimination.

This spring the board adopted a policy for reductions in administrative staff.

In the original budget, all elementary assistant principals in buildings with less than 600 enrollment were eliminated. Later the board decided to keep five of the 10 principals. The 10 elementary schools were paired off so each principal would have two schools. The three assistant principals allowed to remain in the larger elementary schools received their new assignments but the 10 principals eliminated found they had to compete for the five jobs.

The two principals in each of the five pairs of schools were asked to submit joint requests for the assistant principal of their choice. These names were given to a screening committee to narrow the choices to two recommendations for each pair of schools. Anderson said he will interview the applicants and make the final decision.

Dismond said it could be possible that some principals may refuse assignments of certain assistants because of race since they are allowed so much input in the selection. Anderson assured him this would not be allowed to happen.

The board approved new school hours for grades kindergarten through six and special education classes. The morning kindergarten students and grades one to six will begin school at 8:15 a.m. with 5 year-olds being dismissed at 11:15 a.m., grades one to three at 2:15 p.m. and grades four to six at 3:05 p.m. Afternoon kindergarten students will attend from 12:05 to 3:05 p.m. and special education students will attend from 8:15 a.m. to 1:35 and 1:55 p.m.

Man Trying to Repay Education Favor

By George Stukenbroeker
Times-Dispatch State Staff

WILLIAMSBURG — When John Curtis talks about education, the conversation inevitably returns to the schoolhouse he attended in upstate New York with its one teacher and 23 pupils.

"The teacher decided three of us should go on to college," he said, "and I was one of them."

Today, Curtis, 70, a computer and telecommunications expert, still appreciates the chance he was given to continue his education, which he believes allowed him to become "a happy and self-reliant human being."

THE 1930 YALE GRADUATE is attempting to give others a chance to enrich their lives through education by making it easier and less expensive for people to receive instruction through the use of electronic technology.

Curtis began his efforts in 1973 when using his technological expertise and \$150,000 in privately contributed funds (\$40,000 from his own pocket), he established the Center for Excellence, which he describes as "America's first telecommunications laboratory."

Based in Williamsburg, Centex is an expanding non-profit corporation for which Curtis is chief operating officer.

THOUGH HE WORKS more than 55 hours a week for the corporation, Curtis does not accept a salary. "I've never gotten a dime back from it," he said.

Instead Curtis feels the gratification he receives by seeing his plans broaden educational opportunities is enough to make his contributions to Centex "worth it."

Curtis outlined those plans in a 1968 paper, which began by explaining how society's educational needs are not being met by the existing schooling system.

Curtis believes "barriers" such as time, geography and cost are preventing major segments of the population

from increasing their education.

Curtis, therefore, devised plans for a network of broadcast stations stretching across the United States that would use a variety of technological innovations, principally television, to reduce these barriers.

TO PROVE THAT such a national network would work, Curtis sought to establish one on a miniature scale. After studying areas all over the country, Curtis decided that the Peninsula region of Virginia represented almost a "near-perfect microcosm of American society."

Studies showed "the Peninsula to be a typical social, economic and ethnic cross section of America," said Curtis.

Curtis hopes to have 15 stations open by 1985. The only one in operation is at the College of William and Mary's Phi Beta Kappa Memorial Hall.

With a staff of 24 it produces three programs. One program uses television to educate unwed mothers who have children suffering from learning disabilities. Another uses radio to provide the blind and homebound with daily accounts of current events. The third uses television to train schoolteachers to recognize and deal with the needs of handicapped children.

THE PROGRAMS ARE FINANCED by yearly grants from the Department of Health, Education and Welfare and receive support from state and local departments of education.

"The reason why we've been given more than \$1 million by the federal government [over the last four years]," said Curtis, "is because what we've been doing will have value to the rest of the country."

"I know we're right, but we have to get others to think we're right," he said.

But while Curtis was able to convince the federal government of Centex's potential, he had to fight to get state money for his system.



T-D Photo

John Curtis Is Centex Chief of Operations
Telecommunications Expert Accepts No Salary

FIVE YEARS AGO he requested financing from the Virginia Public Telecommunication Council, which oversees the state's public broadcasting stations, and was turned down. The VPTC not only refused to provide funds for Centex, according to Curtis, but also declined to endorse it as a new concept in educational technology.

"They were afraid we would get public dollars that they wanted," Curtis contended. "Their primary interest is in fostering public broadcasting, not public education," he added.

But, according to Curtis, a Centex station is 20 times cheaper to operate than one for public broadcasting and can develop programs to cater to the needs of specific minorities in its 20-mile range, while, by law, a public broadcast station's programming must be for general consumption.

Furthermore, Curtis said, Centex is meant eventually to be financially self-supporting while public broadcasting "has never paid for itself."

COUNCIL, Curtis went before the House of Delegates' Committee on Education to argue for Centex in 1975. His efforts proved successful as the House eventually passed a resolution ordering the council and the Virginia Department of Education to study and submit a report on Centex to the governor by November 1975. The two groups' subsequent report was favorable and center was cleared to receive state money.

Curtis said that he maintains an open offer to the state to take over complete control of Centex. "Anytime the commonwealth wants to take over Centex they can," he said. "The only two requirements are that it must remain non-profit and they must promise to keep it going."

Curtis emphasized that, as new Centex stations open, they will attempt to identify the "grass-roots educational needs" of the region to which they broadcast.

cont

FOR EXAMPLE, the first program to be aired from the Williamsburg station, which instructs schoolteachers in how to work with handicapped children, was begun, said Curtis, because extensive studies showed that most Williamsburg area teachers lacked such training.

"It was the most important unfulfilled educational need in the Peninsula of Virginia," he said.

Now in its third year, the project consists of 14 courses taught by college education professors to local teachers who upon completion of the course receive college or teaching recertification credits.

But instead of the teachers who may live 20 miles away driving long distances to attend a professor's lecture, Centex allows them to commute to their own schools where a television set and a conference telephone allow them to see, hear and question their instructor. The instructor can see the students by way of a portable black-and-white camera which is delivered to each of the schools by a Centex van.

ACCORDING TO CURTIS, this arrangement reduces the traveling time and cost to teachers while it does not diminish the effectiveness of the instructor.

For providing in-service teacher training courses, Curtis said state and local authorities will pay Centex \$3 for each student taught. Citing financial projections compiled by Centex, Curtis said this \$3 fee and the abundance of teachers who could take Centex courses in the Peninsula area should easily allow Centex to cover all of its operating expenses once its Norfolk station becomes operational in February.

So far teacher response to Centex is good, according to Curtis.

CenTex Given \$175,000 For TV Tower

WILLIAMSBURG — A William and Mary-based educational research firm has received another \$175,000 in federal money to continue its pioneering efforts in using electronic technology for educational purposes.

The Center for Excellence Inc. (CenTex) will use the money to construct a television tower in Norfolk so that teachers in that city and outlying areas can take televised two-way courses in special education, said CenTex founder and chief operations officer John A. Curtis.

This grant brings to \$1.3 million the amount of federal money the firm has received for its work which began here in 1976 and is aimed in part at putting to work federal requirements for the education of the handicapped.

The Norfolk tower will be CenTex's third. Towers are already located in the Williamsburg area, where broadcasting began more than a year ago, and in Newport News, where broadcasting should begin by the time schools open in the fall.

Curtis said he believes construction of the Norfolk tower, to be built somewhere in the southern half of the city, will be completed by February 1980. It will permit broadcasting special education courses throughout Norfolk, Virginia Beach, Chesapeake, Portsmouth, part of Suffolk and Isle of Wight County.

The Norfolk station is one of five "backbone" stations CenTex officials hope to build in the next three years. The towers would stretch from Norfolk to the eastern edge of Richmond. Other "rib-stations" would broadcast to schools as far away as the Eastern Shore, Tappahannock and Emporia.

The order in which these stations would be built has not been determined, Curtis said.

The courses are offered to teachers in their schools immediately before and after regular school hours. They are taught by members of the William and Mary faculty and may be used to renew teaching licenses. The technology which CenTex uses permits students to question teachers about lectures.

In a related development, CenTex officials said the firm will move its operations from Phi Beta Kappa Hall on the William and Mary campus to trailers behind Berkeley Elementary School this summer, in accordance with the firm's contract with the Williamsburg-James City County school system.

Here's a unique way to go to college

Laid up with a back injury, one sophomore at the College of William and Mary feared she would have to drop out of school.

Instead, the college drops in on her via a unique two-way television system whose components are delivered to her bedside by a van, each

AT THE COLLEGE

school day from the campus 20 miles away.

And unlike standard educational television, she can talk to her instructors, who see and hear her as well as she does them.

This innovation, called "mobile interactive TV," is the latest development of the Center for Excellence (called CenTex for short). CenTex is a non-profit educational and resource development corporation located on the William and Mary campus.

Using TV transmitters and down-converters, CenTex beams educational programs to people up to 20 miles away.

CenTex has the distinction of being the nation's first telecommunications laboratory. It emanates from a two-story television studio and production center in Phi Beta Kappa Hall.

"We selected William and Mary as our site principally because the 550-square mile peninsula area contiguous to the campus is a near-perfect microcosm of American society," said John Curtis, founder of CenTex. "It gives us nearly ideal field laboratory conditions."

But bringing classrooms to shut-ins is only one segment of CenTex's scope. Other applications stagger the imagination; putting psychiatrists in touch with their patients, providing expectant mothers with practical tips on prenatal care, even routine "visits" to the chronically ill and aged can be accomplished via CenTex's systems.

Programs are broadcast on any of 28 UHF channels provided by the Federal Communications Commission. These channels do not interfere with commercial broadcasts, and can be picked up on specially modified television receivers.

CenTex's two-way TV system needs only five parts: a TV studio, two-way transmitter link, main transmitter, two-way receiver and the mobile van. The studio itself needs only two

color cameras; one for close-ups, the other on the instructor. A conference phone allows the student to communicate with the instructor the same as if they were in a classroom.

"Right now our TV classroom on wheels is unique," Curtis notes, "but it's only a matter of time before the rest of the country applies it to their needs."

"Professionals, such as doctors, lawyers and engineers, can receive their continuing post-graduate education without leaving their offices, while members of the general community can obtain an education or even a medical checkup in their homes."

Curtis founded CenTex because he knew that technology, which was developed by education, would someday have to do an about-face and develop education.

"There are 21 million Americans who are currently educationally deprived," says Curtis. "Telecommunications is the fastest, cheapest and most accessible method of reaching them."

Included in the 21 million are the three million Americans who are deaf, dumb or blind. At least half of them, says the CenTex research team, are not getting a proper education.

**10 HONORED
BY CENTEX**

The Center for Excellence Inc., known as CenTeX, honored 10 individuals, one posthumously, during a luncheon on the William and Mary campus May 11.

Three recipients of the five-year award plaques are members of the College of William and Mary administration and faculty. Thomas A. Graves Jr., college president, George R. Healy, academic vice president, and George W. Grayson, Delegate to the Virginia General Assembly and professor of government, were cited for

PEOPLE

their continuing support. Richard B. Brooks, former dean of the School of Education at William and Mary, also was honored for his help in "giving CenTeX its first 'home' at the college.

The late Richard Gifford, who was an engineer and vice president of the General Electric Company and a member of the state board of education, received a posthumous award for "bringing technical integrity to CenTeX's system planning and credibility and expertise to CenTeX's operations."

Three superintendents of schools, Henry A. Rens of the Williamsburg-James City County system; Donald S. Brune of York County; and Don R. Roberts, who recently left the Newport News system to become secretary of education in Arkansas, were honored.

Two area mayors, Vernon M. Geddy of Williamsburg and Vincent J. Thomas of Norfolk, were cited for their participation in the original establishment of the CenTeX system. Geddy was CenTeX's first board chairman.

CenTeX is a non-profit corporation providing futuristic telecommunications delivery technologies for schools, hospitals and social services in the Tidewater area.

City, College To Receive Two-Way Educational TV

By MARCIA MANGUM
Staff Reporter

A planned contract signing Friday between local school officials and the Center for Excellence in Williamsburg will bring televised in-service training to Newport News teachers next fall.

Newport News public school system, Christopher Newport College and CenTex, a regional telecommunications

corporation, have reached an agreement to build a transmitting tower and station here.

CenTex is prepared to spend about \$200,000 for the tower and equipment. It will be its second transmitting station, with the first one built in Williamsburg.

The 300-foot tower will be built on public school property near Todd Stadium on Warwick Boulevard, according to Christopher Newport President James Windsor.

The local schools won't have to provide any money for construction. In addition to use of the land, the college and the public schools will be asked to give CenTex some studio space after the system gets going.

John A. Curtis, CenTex founder and executive officer, plans to build a third station in Norfolk. This will allow professional development programs to cover an area from west of Williamsburg to Virginia Beach.

"What we're building here is a network of towers and equipment that will allow us to take education literally out to the people," Windsor said.

"We're interested in this particularly for teacher training," he continued. "We will be able to use one excellent teacher to send out training to schools so it can be watched by groups of teachers."

CenTex has the unique characteristic of allowing two-way communications between the teacher and the people watching the broadcast, Windsor said.

When the system is completed, a Christopher Newport professor could teach a graduate level course from the campus studio and teachers throughout the city could participate in the class from receiving stations in the public schools.

"We're getting \$200,000 worth of equipment plus a certain amount of free air time per day," Windsor said.

Programs can be transmitted over a 15- to 20-mile radius from the tower. Signals also would be transmitted between the proposed towers.

Ultimately Curtis wants to be able to send courses up from the Christopher Newport and other studios to a satellite for transmittal anywhere in the country.

"Also we'd be on the receiving end from any 'satellite up' station," Windsor said. "Christopher Newport students could listen to a lecture from Stanford University in California."

"We're delighted to have the opportunity to affiliate with this corporation. This will put us on the growing end of technology in education."

Windsor said the local schools are particularly interested in using the telecommunications system to get programs to the handicapped.

For example, he said one person who knows sign language could interpret a lesson for many deaf students in different classes.

CenTex has a program already in its third year in Williamsburg for training teachers to work with special education students.

It is based on a teacher needs assessment survey and addresses unfilled medical, social and educational needs, including an introduction to special education, a sign language course and characteristics of emotionally disturbed children.

Curtis is prepared to start building as soon as the contract is signed and the Federal Communications Commission approves the tower.

Windsor and Don R. Roberts, Newport News school superintendent, are prepared to sign a contract with Curtis Friday morning. Windsor said he hopes to be using the telecommunications system by next fall.

Metro News

Newport News, Va., Monday, Nov. 13, 1978

11

CENTEX links teachers, colleges

By BOB EVANS
Times-Herald Staff Writer

Editor's Note: This is American Education Week, the time the public usually looks at the nation's schools. With criticism of student performance bringing competency tests and demands for back-to-basics programs, The Times-Herald decided to look during this week at how Peninsula schools are teaching their teachers to be more effective.

Faced with rising public demand that they educate more students and with greater success, Peninsula school systems have made teaching their own teachers a major task.

All have programs for improving employees' skills — called "staff development programs" by educators, but some seem more innovative than others.

Teachers in any system may participate in credit and non-credit college course programs coordinated with local universities. The systems make "needs assessment surveys" to determine what type of classes are most needed by their teachers, and these are arranged with the universities.

Both types of classes are also part of statewide teacher certification renewal requirements. Teachers with state certification must take six credit hours of classes every five years to keep their certificates current.

The non-credit courses are usually limited in scope, and give teachers one hour's credit. They generally deal with specific areas of teacher specialties such as dental hygiene, first aid, human relations or new science techniques.

One of the newest of these is the CENTEX system, used in several private schools, Williamsburg-James City County and York County schools. CENTEX, or "Center for Excellence," is a telecommunications system linking schools and their teachers with college instructors via the airwaves.

Operated on an ultra high frequency band, higher than regular television, televised CENTEX classes last from 45 to 90 minutes, before and after school times. This is "one of the great advantages of CENTEX," says A. Edward Sutphin, director of instruction for Williamsburg-James City County schools.

Teachers taking certificate renewal through CENTEX attend classes in front of a television screen, watching and hearing a

college professor selected as an expert on the topic. The students can ask questions of the professors, with all those "attending" the course able to hear as well.

Now in its second year, the non-profit CENTEX corporation has plans to expand its current list of six courses and open a second transmitter in the lower Peninsula area.

Officials of the corporation say they are negotiating with school systems now and could begin service to the southern half of the Peninsula in the spring.

For college credit courses, school systems offer partial and full reimbursement plans to faculty and staff members.

In addition to these classes, local schools hold "in service" days, many of which are programmed for a number of teacher and staff seminars or guest speakers. Poquoson, York County and Williamsburg-James City County hold staff development days before each semester of school for this purpose.

Hampton teachers benefit greatly from revising curriculum guidelines in another staff development effort, according to Dr. Joseph H. Lyles, assistant superintendent for instruction. "This keeps a course fresh and up to date," as well as the teachers, he says.

Teachers and supervisors study the curriculum in Hampton and other school systems and then redraft their program to use the best items from their study, Lyles says.

"This proves to be as valuable as anything we do" for staff development, he adds.

York schools are also involved in RECIPE, "which stands for Reading Expertise through Continuing In-service Programs for Educators."

Funded by a grant from the federal government, RECIPE is a package of reading materials, programs and teaching techniques presented to reading teachers in short classes by a team of nine teachers and para-professionals throughout a school year. The York-originated program has received national attention and is now being offered as part of the CENTEX curriculum.

Daily Press

NEWPORT NEWS-HAMPTON, VA., SATURDAY, NOVEMBER 11, 1978

In-Service Teacher Training May Be Available On Television

By MARCIA MANGUM
Staff Reporter

ROANOKE — Teachers clamoring for in-service training related to special education likely will be able to tune it in on their television sets soon.

At Virginia Education Association workshop here Friday, experts in special education said local school systems will have to supply in-service training on a broad scale for teachers handling handicapped students.

In-service programs for special education are just being developed, but authorities seem to agree they must address specific questions and must be available to the teachers who need it.

With the idea of providing training at the lowest cost possible, Dr. John A. Curtis founded the Center for Excellence in Williamsburg. Centex, as it is called, provides teacher training through telecommunications. Centex began research in January 1973 for project Set-up — special education via telecommunications teacher upgrade.

Now in its third year, project Set-up deals with specific training topics based on a needs assessment survey completed by teachers.

The telecommunications program addresses unfilled medical, social and educational needs, including an introduction to special education, a sign

language course and characteristics of emotionally disturbed children.

Six selected courses are available in Tidewater using the two-way telecommunications series. Equipment needed in the schools to get the program includes a receiver and a viewing set.

"We want the teaching to take place at locations and times that the teachers find convenient," Curtis said. The programs are shown before and after school and teachers view them in libraries or reading rooms.

Curtis said the programs fulfill the state's guidelines for using existing systems and resources as much as possible.

In addition, he said, the topics have statewide applicability and the potential for use all across Virginia. Centex is planning to start building its third studio in the lower Peninsula area soon.

"We can disseminate training at a cost not previously thought possible," he said. Curtis estimated Centex will be able to provide complete in-service training at a cost of \$35 per teacher annually.

His concern is with making teachers aware how easily the service is available. He said 38 percent of teachers in areas where Centex was available last

year participated in the training.

Though his methods involve modern technology, he agrees with many of the traditional principles of in-service training, primarily that it must teach what the teachers want.

In an afternoon workshop on in-service training, Dr. Ruth Mulliken, professor of child psychology at the College of William and Mary, said, "The need for in-service should come from the teachers up, not from the administration down."

"In-service is to help you work with a more diverse group than you have been accustomed to. It should be talking about actual skills, available material and useful techniques to meet Johnny's needs."

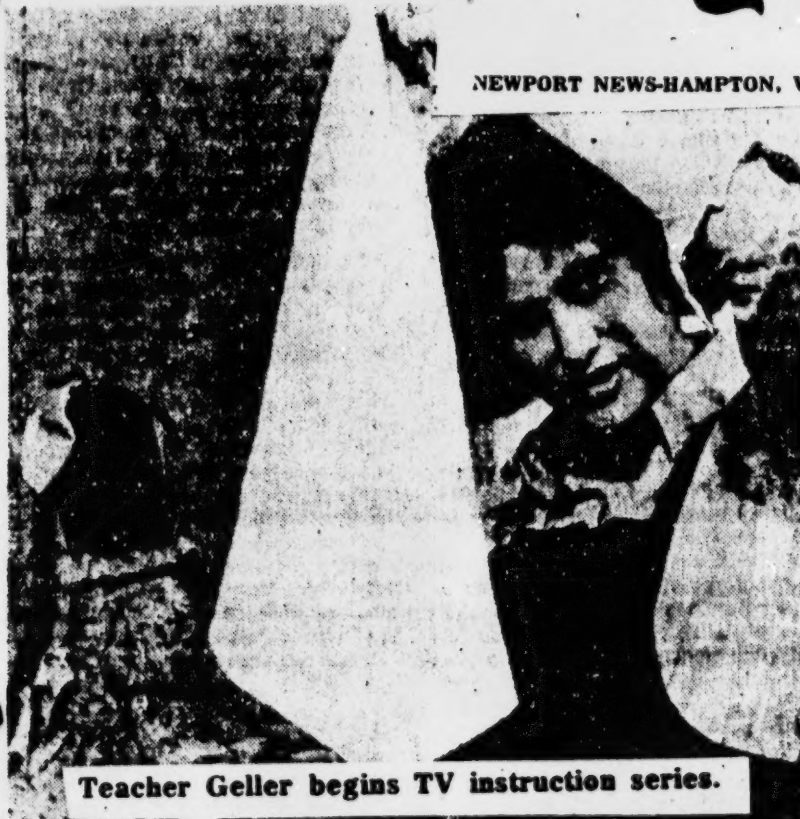
She stressed in-service should be a continuing process with teachers constantly asking for sessions about specific questions.

One main function of in-service is helping the teacher recognize how children may deviate from the norm and how specific problems affect learning behavior in the class, Dr. Mulliken noted.

"If in-service is meeting your needs, dealing with your questions, teaching you how to work with parents, then it is effective," she said.

Daily Press

NEWPORT NEWS-HAMPTON, VA., WEDNESDAY, APRIL 3, 1978



Teacher Geller begins TV instruction series.

TV Pilot To Help 'At-Risk' Children

By MIKE NORRIS
Staff Reporter

WILLIAMSBURG — A pilot program of televised instruction for parents of infants who may not develop at a normal rate began Tuesday on the campus of the College of William and Mary.

Called Project HITT (Homebound Interactive Training via Telecommunications), it is financed by a one-year federal grant of \$185,000 and is conducted by the Center for Excellence Inc. (Centex), an educational research firm based here.

"Session One of Case One" this week involved one young parent with a 7-month-old child. Centex officials hope to expand televised teaching to at least 10 other locations, including private homes and community centers where more than one parent can receive instruction.

Televised home instruction in Project HITT is designed chiefly for parents of so-called "at-risk" or "high-risk" children up to two years old.

A high-risk infant, for example, may not have learned to walk by the appropriate age. High-risk children are likely to be born to women more than 35 or under 18 years old.

At-risk children are those already evidencing some disability.

In the first class from the television studio in Phi Beta Kappa Hall, Susan R. Geller, a teacher with Child Development Resources, a private agency which deals with high-risk children, showed a young mother how to teach the child his name by playing simple games.

After the 30-minute class, Geller said she felt "very positive" about her first such experience. Using a camera rather than visiting the home did not limit her effectiveness, she said.

As in Geller's class, much of the televised instruction in future classes will deal with basic parent skills. Clifford H. Pence, Centex director of telecommunications support services, said.

Televised instruction need not be supplemented with home visits, Geller said.

In addition to demonstrating the success of televised instruction, Centex officials hope to prove it is an economical method that will "break the shackles of time and geography," John A. Curtis, Centex founder and chief operations officer, said.

Useful for parents without adequate transportation, televised instruction also saves the time of instructors who often spend between 40 and 60 percent of their time traveling to and from homes, Curtis said.

To carry the instruction to several locations, Centex plans to "leapfrog" vans carrying television cameras and transmitters.

To install a transmitter and camera in each location would be "prohibitively expensive," Pence said.

Centex already has a large pool of potential students, but the estimated 10 locations where they would be served have not been determined, Pence said.

Centex President Albert Harris, retired dean of the School of Education at Virginia State College in Petersburg, said he feels this is a way of reaching more people.

Centex officials will soon apply for federal funds to continue the experiment through a second year beginning in October, Pence said.

With much of the equipment and planning already finished, Centex officials hope in the second year to accumulate enough statistical data to prove the success of the experiment.

Radio News Service Aims to Aid 'Print Handicapped'

By Sam Barnes

Times-Dispatch State Staff

WILLIAMSBURG — At 7 a.m. tomorrow, a broadcasting service will begin operating out of a tiny booth at the College of William and Mary.

It will have only a few dozen listeners, but it's a sure bet that each of them will be absorbing every word.

The broadcast material will be the news articles of local and state newspapers and magazines. The listeners will be the "print handicapped" — the blind or the physically handicapped who are unable to read.

For 1½ hours, they will hear the news in a way that they have rarely heard it — in depth, and with the odds and ends such as "Dear Abby" that the regular TV and radio networks usually don't carry.

No longer will the listeners have to glean all of their news from a mixture of pictureless TV and abbreviated radio messages.

The broadcasts should be the closest thing to sitting down with the morning newspaper, the organizers of the network hope.

THE PROJECT, serving about a 30-mile radius from Williamsburg, is a pioneer effort at bringing newspapers to the blind with immediacy.

Similar programs are planned for Roanoke and Richmond by the fall and later in Harrisonburg and Norfolk.

Eventually, organizers want to extend the broadcasts to every locality in Virginia.

A non-profit research and engineering foundation, the Center for Excellence Inc., is organizing the Williamsburg

project in cooperation with the college.

Statewide, a new non-profit organization, the Virginia Voice for the Print Handicapped Inc., is directing the efforts to coordinate programs.

Eventually, the network of local broadcasting could reach more than 14,500 Virginians who cannot read because of physical handicaps, according to Virginia Voice Director Carlton P. Brooks.

"We're trying to use Williamsburg as a pilot project to see if the programming is right, to see how it's going to work and to get the bugs out," Brooks said.

THE STATE COMMISSION for the Visually Handicapped has identified individuals who are eligible for the program in the Williamsburg area, and the center has supplied them with receivers to attach to their radios to allow them to pick up the special broadcasts.

Only the print handicapped can obtain the special receivers, and that restriction allows center volunteers to read copyright material over the air without first receiving permission. Copyright laws specifically exempt the reading of or the broadcasting of copyright material to the print handicapped, according to center officials.

The organization has contracted with WBCI in Williamsburg to use its equipment.

The only program the center plans for the first two weeks of operation will be the 90-minute news programs beginning each morning at 7.

Other possible broadcast

features eventually will include the reading of books, national magazines such as Time and other materials, according to Alan R. Blatecky, the center's director of telecommunications.

"THE PROGRAMMING FORMAT will be decided by the listeners," he said. "If they want books, we'll read books. If they want magazines, we'll read magazines." The center plans to conduct surveys to determine listener interest.

The center in Williamsburg plans to go a step further than the rest of the planned broadcast services and offer programs for the deaf.

It will provide Teletype services by July to transmit local news to the deaf who have Teletypes.

Later, it plans to provide Braille printer services for blind-deaf people who own printers. Both services will operate through signals sent over the radio system.

The center also is planning a TV service for homebound children to follow the progress of their regular classes. Warner Cablevision of Williamsburg will broadcast the programs, and children approved for the

project will have special receivers to allow them to pick up the signals on their home sets.

A REASON the center has been able to accomplish so much so quickly is that it has received a \$65,000 grant from a special Department of Health, Education and Welfare fund for the first year of the service.

Subsequent grants will depend upon its performance. Officials hope to get another grant during the next two years to expand coverage throughout Tidewater south of the York River, Blatecky said.

The federal grant is allowing the center to buy the special receivers for the listeners for \$54 each. It is also paying for rental of radio and Cablevision facilities and professional staff members who handle the equipment.

The Virginia Voice, on the other hand, is depending largely on private donations and needs financial help, Brooks said.

So far, the Virginia Voice is operating with private funds and a grant from the National Foundation for the Blind. "We're operating on a limited budget," Brooks said, by paying a staff of two professionals and seeking volunteer help.

TIMES-HERALD:

THURSDAY, June 15, 1978

Broadcast for blind to begin

A Williamsburg-based broadcast network will begin transmitting news and other information June 19 to people who are blind or have difficulty reading printed material.

The Center for Excellence Inc., known as CenTeX, also plans to begin, in the near future, teletype transmissions for deaf people and braille transmissions, over special receivers, for people who are deaf and blind.

The private, non-profit organization is working with College of William and Mary to place receivers in 90 homes and institutions throughout southeastern Virginia.

News and features will be broadcast four hours a day, but organizers expect to increase the transmissions to 10 to 12 hours a day at a later date.

This is the third project of CenTeX special communications services program. The other two are teacher-training broadcasts which are beamed into area schools and children's educational programs for youngsters who are unable to attend school.

The services project is primarily the invention of John Curtis, founder and chief operations officer for CenTeX.

Curtis has been aided by research and support from W&M faculty members and administrators and a \$65,000 grant from the U.S. Department of Health, Education and Welfare.

The system uses existing commercial or public stations' equipment to send programs, which are received through specially designed receivers.

Cost of the receivers to be placed in 90 homes is covered by the federal grant.

THE VIRGINIA GAZETTE.

WILLIAMSBURG, JUNE 14, 1978

Network Will Serve Handicapped

What is described as the world's first multi-media broadcast network designed specifically to reach blind, deaf, elderly, and homebound people of all ages is about to become a reality.

The Center for Excellence Inc., working in coordination with the College of William and Mary, is in the process of placing receivers free of charge in selected homes and institutions throughout southeastern Virginia. Program transmission is scheduled to begin next Monday, June 19.

CenTeX is a private, non-profit research and engineering foundation operating primarily with government grants. Its board of directors comes from a variety of business and government agencies. John A. Curtis, founder and chief operations officer for CenTeX, says the corporation seeks to "supply unfilled educational needs by organizing resources and making intensive use of modern technology to distribute those resources."

Known as Special Communications Services, the project is a result of more than five years research.

Initially, broadcasts will consist of voice transmission with news and features aimed at print-handicapped individuals. Teletypes for the hearing impaired, braille printers for deaf-blind persons, and cable television will be added to SCS capability in the near future. Plans also call for the creation of an SCS network capable of reaching elderly, handicapped, or educationally deprived people all over Virginia.

Since the CenTeX system uses FM multiplex technology to send programs over the subcarrier of existing commercial or public stations, costly transmitters and related

AT THE COLLEGE

equipment are already in place across the nation. Substantial set-up costs are avoided, with relatively modest rental fees required to obtain use of sophisticated hardware.

Other listeners will not find their programs altered or interrupted by the service, as a specially designed receiver is necessary for audiences to pick up the new channel.

The Department of Health, Education and Welfare approved a first-year \$65,000 grant in January, with the stipulation that the level of performance will determine whether or not a second-year grant should be approved.

Curtis said the Tidewater area of Virginia provides an excellent cross-section of the national population, hence his choice to begin the project in this area.

Alan R. Blatecky, director of telecommunications systems operations, will oversee the entire operation of SCS, from program creation to actual broadcast.

Additionally, the CenTeX Network will become the Peninsula component of the Virginia Voice for the Print Handicapped.

Curtis said, "Under the terms of the recently concluded agreement with Warner Cable, we will be developing an experimental installation to distribute educational programming. The multiplexing of the carrier of station WBCI in Williamsburg is the fourth of six planned methodologies in the CenTeX system matrix."

Programming for CenTeX originates either at Phi Beta Kappa Hall or Old Rogers Hall on the William and Mary campus. Dedication ceremonies for the new communication service are scheduled for early July.

Primarily the invention of the 69-year-old Curtis, the CenTeX-SCS system achieved its present form through research by William and Mary faculty members and support from key administrators with the college. The new approach has had the support of both federal and state volunteer and service organizations.



William and Mary News

Unique Broadcast Network Being Activated by Centex

VOLUME VI, NUMBER 35
TUESDAY, JUNE 13, 1978

What is described as the world's first multi-media broadcast network designed specifically to reach blind, deaf, elderly, and homebound people of all ages is about to become a reality.

The Center for Excellence, Incorporated (CentEx), working in coordination with the College, is in the process of placing receivers free of charge in selected homes and institutions throughout southeastern Virginia. Program transmission is scheduled to begin June 19.

CentEx is a private, non-profit research and engineering foundation operating primarily with government grants. Its Board of Directors comes from a variety of business and government agencies. John A. Curtis, founder and chief operations officer for CentEx, says the corporation seeks to "supply unfilled educational needs by organizing resources and making intensive use of modern technology to distribute these resources." Known as Special Communications Services (S.C.S.), the project is a result of more than five years' research. Curtis calls it "a significant and innovative step toward the long range goals of CentEx."

Initially, broadcasts will consist of voice transmission with news and features aimed at print-handicapped individuals. Teletypes for the hearing impaired, braille printers for deaf-blind persons, and subsequently cable television will be added to S.C.S. capability in the near future. Plans also call for the creation of an S.C.S. network capable of reaching elderly, handicapped, or educationally deprived people all over the Commonwealth of Virginia.

Curtis said that support from William and Mary has proved "germinal" to the obtaining of funding on all levels, and that the Tidewater area of Virginia provides "an excellent cross-section" of the national population, hence his choice to begin the project in this area.

Since the CentEx system uses F-M multiplex technology to send programs over the subcarrier of existing commercial or public stations, costly transmitters and related equipment are already in place across the nation. Substantial set-up costs are thereby avoided, with relatively modest rental fees required to obtain use of sophisticated hardware. Other listeners will not find their programs altered or interrupted by the service, as a specially designed receiver is necessary for audiences to pick up the new channel.

Primarily the invention of the 69 year old Curtis, whose patents in the mobile communications field have earned him the respect of technologists and the attention of government officials, the CentEx-S.C.S. system achieved its present form through research by William and Mary faculty members and support from key administrators with the College.

Equally important, the new approach has had the support of both federal and state volunteer and service organizations. The U.S. Department of Health, Education and Welfare approved a first year \$65,000 grant in January, 1978, with the stipulation that the level of performance will

determine whether or not a second year grant should be approved.

Alan R. Blatecky, director of telecommunications systems operations, will oversee the entire operation of S.C.S., from program creation to actual broadcast. Blatecky has been active in building the S.C.S. concept since July, 1976.

Additionally, the CentEx Network will become the peninsula component of the Virginia Voice for the Print Handicapped, which is under the direction of Carlton P. Brooks. Combining the two services will greatly enlarge the capacity of both the Virginia Voice and S.C.S.

Curtis, who expressed his enthu-

siasm for the future of CentEx-S.C.S., said, "CentEx is developing in the Tidewater area of Virginia the world's first telecommunications laboratory. It has already established research installations involving the use of the common telephone line, two-way and mobile television. Under the terms of the recently concluded agreement with Warner Cable, we will be developing an experimental installation to distribute educational programming. The multiplexing of the carrier of station WBCI in Williamsburg is the fourth of six planned methodologies in the CentEx system matrix."

Programming for CentEx originates either at Phi Beta Kappa Hall or Old Rogers Hall on the William and Mary campus. Dedication ceremonies for the new communication service are scheduled for early July.

Daily Press

Hampton Roads Morning Newspaper

NEWPORT NEWS-HAMPTON, VA., TUESDAY, JUNE 13, 1978

FOR BLIND, DEAF, ELDERLY

Centex To Offer New Service

WILLIAMSBURG — Multi-media broadcasts of educational programs and services for blind, deaf, elderly and homebound persons in southeastern Virginia are scheduled to begin June 19.

The Center for Excellence Inc. (Centex), a private, non-profit research foundation using federal funds, is now placing free receivers in selected homes and institutions for the first broadcasts. The first broadcasts will consist of reading to the blind and some elderly persons.

Project SCS (Special Communications Services) seeks to "supply unfilled educational needs by organizing resources and making intensive use of modern technology to distribute those resources," John A. Curtis, Centex founder and chief operations officer, said.

The project is the result of more than five years of research and is described by Curtis as "a significant and innovative step toward the long-range goals of Centex."

The first year of the project is funded with a \$65,000 grant from the U. S. Department of Health, Education and Welfare. Funding for the second and third years depends on the performance of the program.

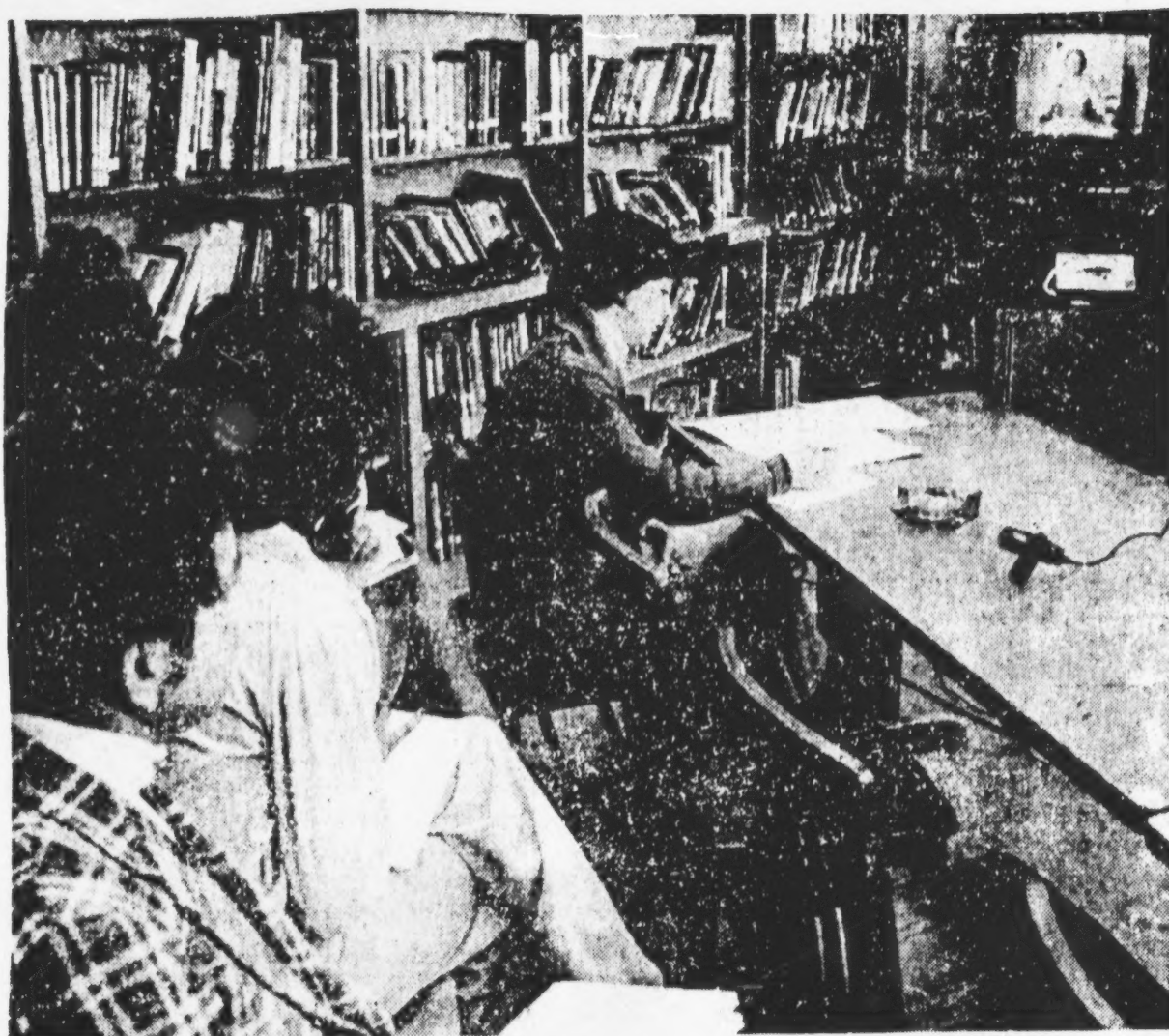
The first broadcasts will consist of news and features aimed at "print handicapped" persons. Later, probably within the first week, teletypes for persons with impaired hearing, braille printers for deaf and blind persons and cable television will be added.

Centex officials will join with Virginia Voice for

the Print Handicapped under the direction of Carlton P. Brooks to create a network capable of reaching elderly, handicapped or educationally deprived persons all over Virginia, said Alan R. Blatecky, Centex director of telecommunications systems operations. Blatecky will oversee Project SCS.

Centex broadcasts are beamed from studios in Phi Beta Kappa Hall on the campus of the College of William and Mary.

SCS is one of several projects being conducted by Centex, including Project HITT, a television pilot to help "at-risk" children, and Project SETT-UP, which includes in-school teacher training classes.



Class watches monitor for teacher re-certification course.

Centex Dedicates 2-Way Telecommunications System



Ruth Mulliken lecturing in Phi Beta Kappa Hall.

(Staff Photos by Willard Owens)

By MIKE NORRIS
Staff Reporter

WILLIAMSBURG — Thirty-five Williamsburg-James City County students sitting in 10 different schools Thursday morning heard and questioned the same teacher.

The students were private and public school teachers taking an eight o'clock class in the psychology of learning disabilities taught by Ruth K. Mulliken, professor of education at the College of William and Mary.

Mulliken talked to and with the teachers who were taking the course for re-certification via an elaborate two-way video-audio telecommunications

system developed by the Center for Excellence Inc. (Centex), a private educational research firm here.

A number of state education officials and representatives of the college and local schools were on hand Thursday for the dedication of the \$425,000 system, including Henry W. Tulloch, president of the State Board of Education, and Henry A. Renz, superintendent of Williamsburg-James City County Schools.

Tulloch praised the system and Centex founder and chief operations officer John A. Curtis.

"It would never have been done without the leadership and commit-

ment to the idea," Tulloch said.

Tulloch emphasized that the Centex project is Virginia's first effort to make extensive use of modern technology to increase the scope of education in the state.

A total of 154 school administrators, teachers, secretaries and other school personnel are taking the free courses, which began airing Feb. 16.

Each of six courses taught by college professors or local school officials is taught twice a week either at 8 a.m. or at 4 p.m.

Participants, teachers and operators agree the unique feature of it is that teachers and students can talk to each

other, so that it resembles a normal classroom.

Thomas A. Fallen, an eighth grade science instructor, said an important benefit of the system is convenience — "a painless way" to renew his teaching certificate.

Williamsburg-James City County teachers are required to acquire six credits every five years to remain certified.

Mulliken, Fallen's instructor, said she misses the face-to-face interaction of a regular classroom and hopes her students "will become more spontaneous" in asking questions over the system.

Equipment worth \$250,000 has been installed in a television studio in Phi Beta Kappa Hall on the college campus and at 10 area schools: Berkeley, Norge, Bruton Heights, Rawls Byrd, Matthew Whaley and Magruder elementary, James Blair Junior High School, Jamestown Academy, Walsingham Academy and educational facilities at Eastern State Hospital.

The in-service teacher training portion of the Centex project, which could be expanded to counsel parents in individual homes, was funded by the federal Department of Health, Education and Welfare.

The six courses being taught now

Daily Press

SUBURBAN



FRIDAY MORNING, Feb. 24, 1978
Page 37

relate primarily to the implementation of a federal law requiring all children to be educated in the "least restrictive environment." Some educators call this process "mainstreaming," although that is not specified in the law, Mulliken said.

The Times-Herald

Metro News

Newport News, Va., Thursday, Feb. 23, 1978

13

School tunes in 2-way TV

The four teachers at James Blair Junior High School in Williamsburg seemed calm and unconcerned early today as they sat in the school library, watching television and taking notes.

But the four were taking part in what is believed to be the world's first two-way live television system built specifically to train teachers, professionals and parents of handicapped children.

As they watched the broadcast coming from Phi Beta Kappa Hall across town, they saw the color image of Dr. Ruth Mulliken, professor of education at College of William and Mary, as she delivered a lecture on the psychology of

learning disabilities.

A total of 150 other teachers in nine other schools in Williamsburg, James City County and York County heard the audio portion of the lecture.

All could ask questions; Dr. Mulliken could hear teachers from the other schools, but she could both see and hear the teachers at James Blair.

Eventually, all participating schools will have video as well as audio, but James Blair was selected as the first site.

Although the current 12-week series

of courses began Feb. 16, the system was officially dedicated today by Henry W. Tulloch, president of State Board of Education, with several state and local dignitaries on hand at both the Phi Beta Kappa Hall base station and the James Blair receiving center.

The project was developed by Center for Excellence Inc., a non-profit educational corporation founded by John A. Curtis, who serves as the center's chief operations officer.

It has been in the planning stages for six years and is funded by a \$625,000 grant from U.S. Office of Education's Bureau of Education of the Handicapped.

Tulloch termed today a "historic occasion," marking Virginia's first use of modern technology to increase the scope of its educational processes.

Curtis said additional funds are anticipated which will enable the center to extend the system throughout Tidewater and, later, throughout the state.

Other schools taking part in the current program, all located within 20 miles of the Phi Beta Kappa Hall base station, are Berkeley Elementary, Bruton Heights Elementary, Eastern State Hospital, Jamestown Academy, Magruder Elementary, Matthew Whaley Primary, Norge Primary, Rawls Byrd Primary and Walsingham Academy.

16 Teachers Honored For '4 Eyes' Work

16 Williamsburg-James City County public school teachers have been recognized for their contributions in the development of "Four Eyes," an instructional television training system developed by CenTex.

Certificates were presented after a demonstration of the new system last Friday at the College of William and Mary. Four Eyes records and televises an instructor at one location and a student body elsewhere. Both the picture and the audio from each location is transmitted to the other to maintain face-to-face instruction.

The local teachers were recognized for their volunteer participation in pilot-tests of

the program. The tests were organized at Rawls Byrd and Norge Primary schools under the direction of schools superintendent Henry A. Renz; Edward Sutphin, director of instruction; and Barbara McLane, director of pupil personnel services.

Certificates were presented to: Elizabeth Beckhouse, Florence Bragg, Dorothy Cobb, Bette Farrar, Carilyn Lewis, Ruth Pope and Joseph Keggan from Rawls Byrd; and Judy Evans, Jan Gandy, Karin Kerner, Bernice Lewis, Vickie Robertson, Nancy Smith, Rosanne Wilson, Evelyn Woods and Lois Yates from Norge.

Four Eyes is believed to be the first program of its kind in the world.



John A. Curtis

'Four Eyes' Can Teach

WILLIAMSBURG — The Center for Excellence Inc. Friday demonstrated its pilot project to use two-way television for teacher training.

The system is called "four eyes" because it involves the simultaneous recording and televising of an instructor at one location and a student group at another location.

The Center, abbreviated CenTeX, has spent the past year obtaining equipment, developing a teacher training curriculum in the area of special education and testing the system under simulated conditions.

The work was done with a grant of \$125,000 from the Bureau of Education for the Handicapped, U.S. Office of Education.

At a press conference Friday CenTeX officials said they are pleased with the results of the pilot and hope to offer the telecommunications system to all seven public schools and two private schools in the Williamsburg-James City County area next year.

The system is designed to provide in-service training and recertification courses for teachers at a convenient time and place.

CenTeX is seeking \$375,000 in federal funds for each of the next two years to purchase the equipment necessary to put the system on the air.

CenTeX is the brainchild of James City County resident John A. Curtis who is convinced telecommunications has a multitude of uses in education — in the training of teachers, doctors, lawyers and actors.

Working on the project with Curtis have been officials from the College of William and Mary and the local school system.

Williamsburg Mayor Vernon M. Geddy Jr. is chairman of the board and Dr. Richard Brooks, retired dean of the school of education here, is corporate president.

The pilot program involved eight training sessions for small groups of teachers at Rawls Byrd and Norge primary schools.

The teachers gathered around a television set in

one room and listened to an instructor in a room down the hall lecture on special education. Both the teachers and the instructor could see and talk to each other.

While the pilot project was conducted with cable run down a school hallway, CenTeX hopes that next year it can provide programming from its own studio on the William and Mary campus.

Each school would be equipped with a receiving antenna, a downconverter and a television set, according to Alan R. Blatecky. Blatecky and Clifford H. Pence Jr. have been running the program.

All of the connecting schools and the instructor will be able to talk to each other. A mobile transmitting van will be used to give one group two-way video capability.

Cost of an installation at each school would be approximately \$4,500, according to Blatecky.

CenTeX also needs to purchase studio equipment and a transmitter.

The signal will be broadcast over a radius of 20 miles on a special low power educational circuit that can be seen only with a special adaptor.

Blatecky is still tabulating teacher reaction to the program, but says most teachers said they liked it better than regular in-service training programs.

The pilot program used six lecturers, four from William and Mary, one from Hampton Institute and an optometrist from Richmond.

Brooks and Dr. Louis Messier, associate professor of education, have been developing a curriculum in special education that meets state requirements for general teacher certification.

CenTeX plans to offer 22 different short courses next year and will modify its offerings based on teacher interest. The courses will be offered at times convenient to teachers, such as before and after school.

Expansion of the program is dependent on more federal money. Blatecky said continuation of funding at the present level of \$125,000 would limit CenTeX to essentially what it did this year.

Schools' two-way TV seen

Several Peninsula schools may get a new form of two-way television instruction next year, officials of Williamsburg's Center for Excellence Inc. (CenTeX) announced today.

At a 2 p.m. press conference at College of William and Mary, CenTeX officials demonstrated a system they call Four Eyes that allows students and teachers to talk and see each other — even if they're in different cities — through television.

If federal money is approved, said John Curtis, founder of the non-profit CenTeX, the system will probably be used next year in Williamsburg, Eastern State Hospital, Poquoson and James City and York county schools.

CenTeX developed the system, unveiled today, with the aid of a \$125,000 grant from the U.S. Office of Education's Bureau of Education for the Handicapped.

Curtis said the grant expires in June, and new money (which he believes is forthcoming) will be needed to use the system next school year.

The significant thing about Four Eyes is that it allows teachers to communicate with students miles away

without wasting time and money on travel.

Thus, problem students at Eastern State Hospital can talk to teachers from other school systems without the teachers having to actually travel to Williamsburg.

Since television cameras are used on both ends, instructors and students can show and question each other about objects under discussion.

And students can talk back to their instructors, interrupting them to ask questions or request a more complete explanation of a specific subject.

But, Curtis added, the system can also be used to help educational experts certify public school teachers over television, in the comfort of the instructors' office and the teachers' schools, without any traveling.

And they can help students in one school get lessons from an expert in a particular field at another school in another city.

Four Eyes was tested for four weeks in January and February at Rawls Byrd Primary School and another four weeks in February and March at Norge Primary School, both in James City County.

Teachers in one end of each school spoke to teachers in an opposite end, Curtis explained.

No actual over-the-air TV transmissions were involved in this case, he

said, because that idea is already proven — CenTeX officials merely wanted to see how teachers would respond to the idea.

They responded very well indeed, he said.

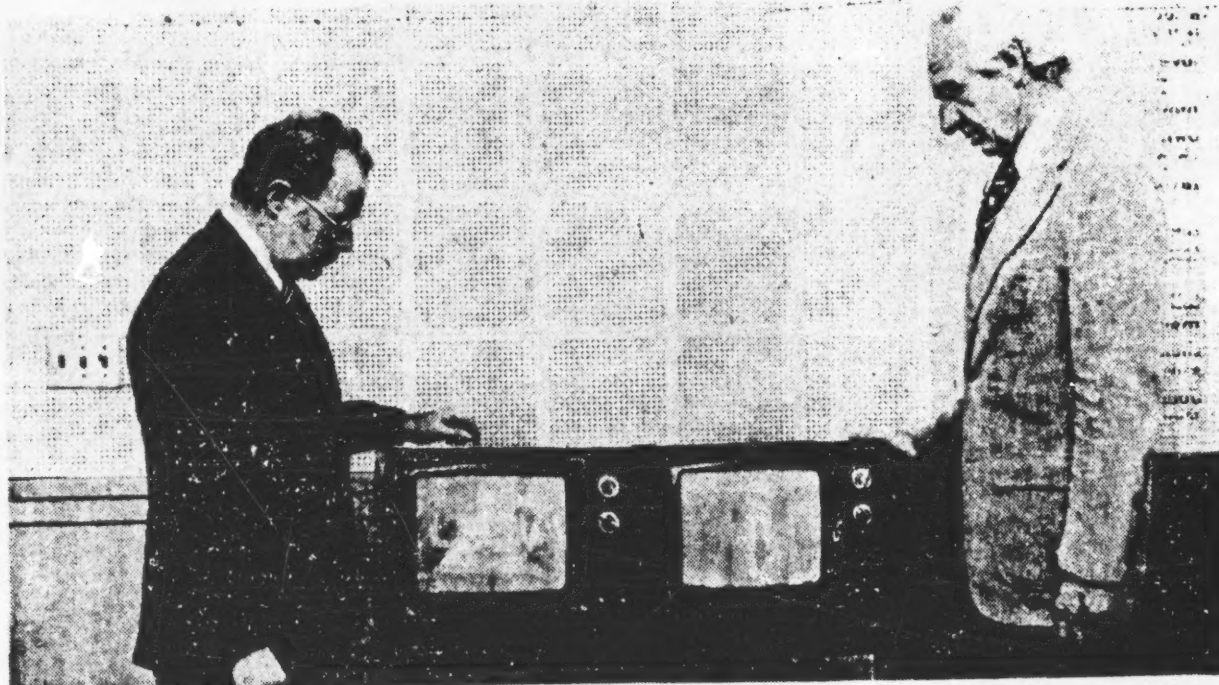
Curtis said the main idea behind the system was to allow special education specialists in a central location to instruct teachers in different schools over a scattered area without traveling.

But, he added, he believes the system will have special impact in psychiatric and psychological interviews and training of student doctors and para-professionals, as well as being useful in training student lawyers and actors.

CenTeX is now seeking 21 faculty members from W&M and Hampton Institute, as well as instructors from state agencies and private schools, to develop the program's curriculum.

Curtis said teacher need surveys are being conducted at Walsingham and Jamestown academies (private schools in the Williamsburg area) as well as York County and Poquoson schools and the elementary school at Eastern State Hospital to see whether they want to use Four-Eyes.

If the answer is yes, Curtis said, the program will be used in those areas next years, once federal money is obtained.



Williamsburg School Supt. Henry Renz (left) and William and Mary Vice President George Healy inspect TV system that lets students watch teacher, and vice versa.

Vision Of National TV Education Coming Closer

By VIRGINIA GABRIELE
Staff Reporter

WILLIAMSBURG — John A. Curtis has a vision of harnessing telecommunications for education.

For the past eight years the retired computer and electronics specialist has been promoting a national network that would link people via special television circuits to this nation's vast but geographically concentrated resources of knowledge and education.

"The day of having to go to a given geographical location at a designated time to get educated is past in my opinion," said Curtis recently.

Sitting in his comfortable study surrounded by nearly a room full of data on telecommunications, Curtis expounded on his theory that democracy will be destroyed in 25 years if education "doesn't wake up."

Curtis has written technical and general interest papers, given speeches attended conferences, worked on national advisory committees, solicited support from the educational community and collected nearly a room full of data.

Three years ago he lined up academic, civic and business support in the Williamsburg area and founded a non-profit company, the Center of Excellence Inc., abbreviated CenTeX.

Curtis, who had conducted think tanks around the country and done extensive consulting work in electronics, organized lengthy methodical studies to give direction to his telecommunication ideas.

The studies revealed the Peninsula is a "near-perfect microcosm" of American life and special education is its major education problem.

Just finding the proper federal agency to submit the grant application took nearly a year, according to Curtis.

Now Curtis, who can quote complicated statistics and theories from memory and put his hands on any paper in his massive files within a few minutes, has a chance to put his theories into action.

The Bureau for the Education of the

Handicapped in the U.S. Office of Education has awarded CenTeX a three-year grant of \$375,000.

The funds will be used to purchase and install telecommunications equipment and to develop and institute in-service training programs to teach public school teachers how to cope with special education children.

The first year of the grant will be spent working out the specifics of the program and engineering the two-way system.

The idea will be tested in several Williamsburg-James City County public schools during the second year and distributed throughout the Peninsula and adjoining areas in the third year, according to plans.

Expanding the project to remote schools and the homes of special education students would require a mobile van which will be part of a future funding application.

The need to break the barriers of geography and time that limit utilization of educational resources was imprinted on Curtis' mind in his childhood.

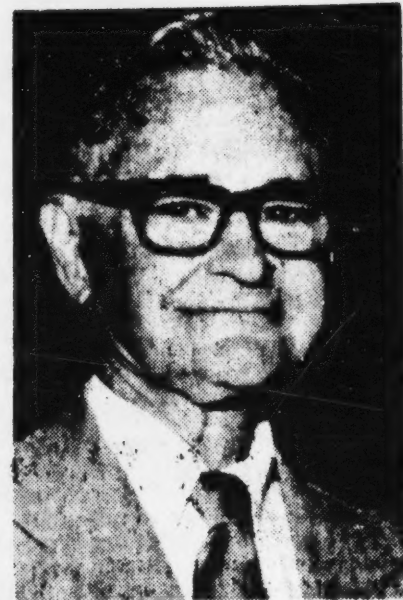
The young teacher, in his one-room schoolhouse in the Catskill Mountains would regularly take a 110 mile train ride to get books for her students from the New York City public library.

Telecommunications has already broken these barriers in many areas of the country.

Closed-circuit microwave hook-ups have linked Boston's Massachusetts General Hospital for the past seven years with a medical station at Logan Airport across the harbor and with a veteran's hospital in Bedford 25 miles away.

Young lawyers in the Washington, D.C. law office of Curtis' father-in-law gather around a television screen every week to learn the laws of Virginia, Maryland and the district.

The special low power educational circuits that will be used by CenTeX are already in use across the country, although not in Virginia, according to Curtis. Unlike regular television



JOHN A. CURTIS

circuits, the need for a special adaptor makes these circuits essentially private.

The College of William and Mary is working closely with CenTeX. Professors in the school of education will be developing the curriculum for the project and the college's television technicians will be doing the actual transmission.

The grant comes at a time when the college's television program is at a crossroads and will give the program new studio and portable video equipment and new direction.

Curtis explained special education was chosen for the project because it is "the one area that will show the best results in the shortest period."

He envisions the system ultimately bringing education into the home from birth to death.

Once CenTeX's project is running smoothly, Curtis plans to bow out and turn his interests in invention and innovation toward "another equally intriguing project."

Two-Way TV Nets Local Firm Grant Of \$375,000

A federal grant totaling \$375,000 over three years has been made by the U.S. Office of Education to Center of Excellence Inc., a nonprofit corporation involved in educational research here.

The grant, in yearly allotments of \$125,000, will be used to develop two-way telecommunications systems that will carry special educational services to remotely located classrooms, according to John A. Curtis, executive vice president of the corporation. The Centex project is believed to be the first of its kind using two-way television as a medium for disseminating training programs for teachers in special education classes.

Curtis said in an interview Monday that nearly one-third of the public school teachers providing special education services in Virginia are not

certified for their "sensitive" responsibilities. By special education requirements, Centex uses eight categories of mental and learning disabilities, ranging from deafness to emotional instability.

Centex, organized in 1973, is presently housed at Phi Beta Kappa Hall at the College of William and Mary, under a "working relationship" between the organization and

the college, Curtis explained. The 11-member board of directors of Centex includes four faculty and administrator members from the college.

Live broadcasts, videotaped materials, and "two-way" television transmissions will be included in a wide-ranging experiment in upgrading special education teachers' professional skills, Curtis said.

Dr. Richard B. Brooks, president and a director of the nonprofit Centex, will be project director under the grant. The project title is SETT-UP, after Special Education via Telecommunications: Teacher Upgrade. Brooks is dean emeritus of William and Mary's School of Education.

Curtis thanked the College of William and Mary administration, School of Education faculty, and Del. George W. Grayson of

Williamsburg for assistance in securing the federal grant.

TELECOMMUNICATIONS PROJECT

Special Education Grant Made

GABRIELE

Staff Reporter

WILLIAMSBURG — A \$375,000 federal grant has been awarded to a Williamsburg Corporation to develop a two-way telecommunications system for special education training.

The three year grant will be used by the Center of Excellence Inc. (CenTeX) to develop curricula and delivery systems for in-service teacher training.

The funding is the result of three years of effort by John A. Curtis of Williamsburg, a telecommunications expert who is trying to develop a national educational telecommunications network.

Curtis said Monday he believes this is the "world's first project to make intensive use of telecommunications to provide and distribute special education services."

CenTeX will be working cooperatively with the College of William and Mary, whose top administrators are on the CenTeX Board, to develop the project.

The in-service training programs will be distributed first to Williamsburg-James City County schools and later to all school systems on the Peninsula, according to Curtis.

Curtis and Project Director Dr. Richard B. Brooks, retired dean of the School of Education, announced the grant Monday at a press conference in the Great Hall of the Wren Building.

The in-service training programs will be designed to help regular classroom teachers handle special education students in their classes, according to Curtis.

Credit toward teacher certification will be given by the state, according to Brooks.

Curtis explained the first year will be used to engineer the system and develop curricula.

Half of the grant money will be used for equipment, according to Curtis. This includes new studio and portable video equipment for William and Mary's television center; the station, and special adaptors and two-way equipment in the schools.

The system will be installed in Williamsburg-James City County schools during the second year and offered to all Peninsula and neighboring school systems during the third year.

Additional money is being sought to purchase a mobile unit to bring similiar programming into the home, Curtis said.

Brooks and Dr. Louis P. Messier, associate professor of education, will be developing the curriculum along with faculty members from William and Mary, Virginia State College, VPI

and the University of Virginia.

The grant was awarded by the Bureau for the Education of the Handicapped from the U.S. Office of Education.

Curtis said a manual will be developed at the conclusion of the project and the entire project will be evaluated at every step.

Curtis' proposal is an attempt to bring modern technology into a labor intensive field. It utilizes a band of the ultra-high frequency range that has been reserved by the Federal Communications Commission for use by non-profit educational institutions.

Since its formation in January 1973, CenTeX has spent approximately \$150,000, half in cash and half in services, for research and attempts to get funding, according to the press release.

It claims its research has shown that only 60 per cent of the 10.4 per cent of Peninsula residents under 21 who need special education are getting it.

It also claims more

than 30 per cent of the state's special education teachers are not properly certified.

The project would be aimed initially at regular classroom teachers.

Williamsburg Mayor Vernon M. Geddy Jr. is chairman of the CenTeX Board.

Two-way television System to aid teachers

Regular classroom teachers from Williamsburg-James City County public schools will be the first to profit from a new two-way telecommunications system for training in special education.

A \$375,000 grant has been awarded by the Federal Office of Education's Bureau for the Education of the Handicapped to the Center of Excellence Inc., John A. Curtis, the center's founder, announced Monday afternoon.

The three-year grant — \$125,000 per year — will be used to develop curricula and delivery systems for in-service

teacher training.

With the two-way system, students and teachers in the classroom and the teacher in the TV studio will be able to see and hear each other.

Curtis said city-county school officials will meet June 2 to determine the schools and teachers to be involved in the project.

The system will be installed at the end of the first year and be in operation at the beginning of the second year, Curtis said. By the third year, "any school system in the area" (including Southside, Middle Peninsula and

Tidewater) will be able to use the system, he said.

Curtis, who announced the grant along with Dr. Richard Brooks, retired dean of the College of William and Mary's school of education, said it is "believed to be the world's first project to make intensive use of telecommunications to provide and distribute special education services."

Brooks is president of the Center of Excellence — known as CenTeX — and Williamsburg Mayor Vernon M. Geddy Jr. is chairman of the board of directors of the non-profit corporation.

THE RICHMOND NEWS LEADER

Tuesday, May 25, 1976

Foundation Gets Training Grant In Williamsburg

WILLIAMSBURG — A foundation here has been awarded a three-year, \$375,000 grant to develop a two-way telecommunications system to teach area school teachers how to deal with handicapped children.

The grant was awarded to the Center of Excellence, Inc., which will work with the Williamsburg-James City County school system and the College of William and Mary's school of education.

The system will use channels set aside for educational purposes by the Federal Communications Commission and is designed to eliminate the necessity for teachers to commute to distant classes for training.

Old Capital Group Gets U.S. Funds

Times-Dispatch State Staff
WILLIAMSBURG — The Office of Education has awarded a three-year, \$375,000 grant to a Williamsburg foundation to develop a two-way telecommunications system to teach area schoolteachers how to deal with handicapped children, it was announced Monday.

John Curtis, founder of the Center of Excellence, Inc., (Centex) here, said the system will, to his knowledge, be the first ever applied to the needs of special education.

Aid to Teachers

The system, which is yet to be developed, will be used to help regular classroom teachers first in Williamsburg and James City County and then in the Peninsula with the problems of handicapped children, he said.

The teachers will be taught up-to-date information needed in after-school classes.

The two-way electronic system, using 28 channels set aside for educational purposes by the Federal Communications Commission, will eliminate the necessity for commuting to distant classes, he said.

Needed Equipment

Curtis said the equipment needed for the system is "low powered," demanding less than 10 watts, and is easy to operate.

He said he did not know how many cameras and how much equipment would have to be purchased or where the transmitters will be located, but that equipment costs are expected to absorb about half of the \$375,000 grant.

In a 1974 article in the journal, *Engineering Education*, Curtis recommended that a national telecommunications authority be established and that the 28 channels become the basis for a "national telecommunications network for education."

Centex will cooperate with the Williamsburg-James City County school system and the school of education at William and Mary in the special education project, Curtis said.

Dr. Richard B. Brooks, Centex president, and dean emeritus of the school of education, will head the program.

Faculty members from William and Mary, Virginia State College, Virginia Polytechnic Institute and State University and the University of Virginia will assist in various aspects of the program.

The Times-Herald

Metro News

Newport News, Va., Friday, May 21, 1976

9

School television system displayed

The Center of Excellence, Inc. has announced a Monday press conference in Williamsburg at which its officials will explain how they developed a two-way television system that allows teachers to broadcast courses and lets students talk back to them.

Such a system, which the organization claims is "the world's first," obviously would be of help to the handicapped and others who cannot leave home.

The non-profit institution, known as Centex, is associated with the College of William and Mary.